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An Evaluation of
Organizational Effectiveness at the
Naval Air Warfare Center, Aircraft Division,
Indianapolis

by

Daniel J. Ford

September, 1993

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Naval Air Warfare Center, Aircraft Division, Indianapolis

by

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Lieutenant, United States Navy
B.S., Saint John's University, 1985

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of the requirements for the degree of

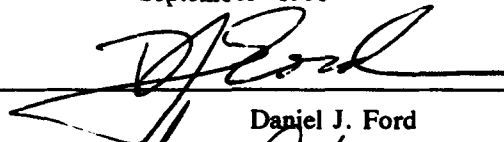
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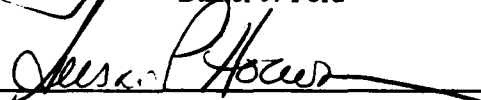
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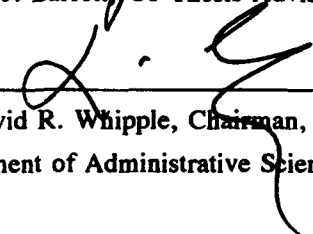
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ABSTRACT

This thesis assesses organizational effectiveness at the Naval Air Warfare Center, Aircraft Division, Indianapolis (NAWC-ADI) after its restructuring to a matrix organization. Data were collected using a survey designed by the author and his advisors. Survey data were gathered from 454 NAWC-ADI personnel from all levels in the organization. The survey asked employees to rate their organization on various "effectiveness"-related variables. The effectiveness variables were categorized as independent, intermediate process, or outcome variables in an organizational effectiveness model. The variables from each category were correlated with each other to test the veracity of the model. The mean scores evaluated for NAWC-ADI as a whole, and sub-group analyses by level and assignment were conducted. Ratings of information availability in several areas were correlated with the model. The results were used to evaluate NAWC-ADI as a newly restructured matrix organization.

All model variables were strongly intercorrelated. NAWC-ADI scored high in the areas of team and individual empowerment, job satisfaction and team cohesiveness. Lower ratings were found for organizational responsiveness, motivational communication, effectiveness of top management, intergroup cooperation, organizational effectiveness, team and individual influence, customer service, and quality of work. Information availability was highest in the area of specific scheduling requirements and lowest in career and advancement paths. Recommendations are offered for further research.

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I. INTRODUCTION

The Naval Air Warfare Center, Aircraft Division, Indianapolis, Indiana, (NAWC-ADI) commissioned a Naval Postgraduate School (NPS) team to conduct an assessment of its organizational communication processes. Having undertaken a significant reorganization in April 1992, upper level management felt that communication gaps were adversely affecting work effectiveness. The research of which this thesis is a part examines communication processes as evidenced by semi-structured interviews and questionnaire data obtained from NAWC-ADI employees. Two theses have been collaboratively prepared as part of this research activity and have common background and literature review chapters. The questionnaire data is the focus of this thesis; the interview data is the focus of the other (Houglan, 1993).

A. OBJECTIVE AND RESEARCH QUESTIONS

The objective of this thesis is to conduct an empirical study to evaluate the various factors of communication effectiveness at NAWC-ADI. The research questions are as follows:

- As an organization, how does NAWC-ADI rate on various indicators of organizational effectiveness?
- What areas of information are most strongly correlated with ratings on organizational effectiveness scales?

B. ORGANIZATION OF THE THESIS

This thesis is divided into six chapters. This chapter is followed by Chapter II, which provides a comprehensive background for NAWC-ADI, its organization, and an overview of recent research conducted in the organization. Chapter III is a review of the literature pertinent to this study. Chapter IV concerns the design, administration, and preliminary analysis of the survey. Chapter V outlines the results of the quantitative analysis of the survey. Conclusions and recommendations are delineated in Chapter VI.

II. BACKGROUND

A comprehensive background of NAWC-ADI is provided in this chapter, including a description of its current mission, organization-wide structural changes, and relevant research done within the organization since the restructuring. The objective is to provide a context to frame the environment in which this research was conducted.

A. DESCRIPTION OF NAWC-ADI

NAWC-ADI was first established as a Naval ordnance plant in 1942. Since that time, it has developed into the Navy's primary research and development organization for advanced aviation electronics (avionics). NAWC-ADI is one of the commands within the Naval Air Warfare Center organization under the control of the Naval Air Systems Command (NAVAIR). An organization chart is provided in Appendix A. While NAWC-ADI does have contracts with the U.S. Marine Corps, Army, and Air Force, the majority of their contracts come from Naval Aviation. NAWC-ADI is involved with integrated avionics management, engineering, acquisition, technology insertion, and manufacturing. These enterprises include pilot and emergency production, electronic system design, transition to

production and manufacturing, and data documentation for commercial production.¹

NAWC-ADI's facilities include a 14-acre main building, a 621,000 square foot manufacturing/assembly facility and \$350 million of capital equipment. The majority of the 3,200 civilians in the work force consists of engineers, scientists, technicians, and skilled craftsmen.

As a previously operated Naval industrial fund site, NAWC-ADI now operates as a Defense Business Operations Fund (DBOF) activity. The funding for NAWC-ADI comes directly from the contracts it has with Department of Defense (DoD) organizations. This funding arrangement requires NAWC-ADI to operate in a buyer-seller relationship similar to private industry. Only by obtaining new contracts or meeting the performance requirements of existing contracts can NAWC-ADI receive funds to operate. Therefore, productivity and effectiveness are critical to NAWC-ADI's existence.

B. ORGANIZATIONAL STRUCTURE

Prior to April 1992, NAWC-ADI's organizational structure was typical of most military industrial activities; a functionally organized system with a strong vertical hierarchy.

Within this structure, each department operated as a "vertical chimney" with separate agenda, priorities,

¹Information from NAWC-ADI's Command Information Pamphlet

and organizational values. With the existing barriers between departments, each director and manager approached corporate strategy achievement by making operational decisions solely from their functional orientation. Communication and coordination flowed vertically, along the established chain-of-command, but barriers between departments inhibited lateral, inter-department communication and coordination. (Meier, 1992)

The command structure included an executive level with special assistants for staff responsibilities and ten separate departments for the operational or industrial functions (see Appendix B). Communication from upper-level management filtered down through department heads and supervisors to the employees, and upper-level management was informed of current events only after many layers of managers filtered the information.

In October 1991, faced with the growing pressure of widespread changes within the Department of Defense, the Commanding Officer and Executive Director established a steering team to develop a new organizational concept of operations. This team was given this guideline: The organization must be process-oriented and customer-driven.

The steering team consisted of mid-level managers. The team used the "Leverage Process" provided by a management consulting firm, The Leverage Company (Greenwich, CT), which had consulted with NAWC-ADI on specific issues in the past. The Leverage process will be described in detail in section C. With the Leverage Process as the basis of their planning model, the steering team recommended that the best method for

improving NAWC-ADI's organizational effectiveness and to meet its long-term goals was to implement a command-wide matrix organization.

The Commanding Officer and Executive Director concurred with the recommendations and began to plan for the transition to a matrix command structure. Four senior civilians were selected as Avionics Group Organization (AGO) Directors. These individuals were tasked with developing an implementation plan. The Executive Officer was tasked with developing a plan to incorporate the Command Staff offices and special assistants into the new organizational structure.

Under the reorganization, one side of the matrix is comprised of three Directorates: Design (Alpha); Acquisition and Manufacturing (Beta); and Fleet/User Support (Gamma). Appendix C provides a complete organizational diagram. These directorates were further broken down into Competency Centers (CC). These centers are responsible for providing project teams with the resources (material, manufacturing, and personnel) to meet project commitments. Additionally, the centers are responsible for the development, training, and administrative requirements of the employees within their competency center.

The reorganization also created a Project Office, forming the second side of the matrix. The Project Office is subdivided into four areas: Avionics (A), Anti-submarine Warfare (B), Platforms (C), and Weapons Avionics (D). Each of these

sub-areas contains multiple projects. These projects are coordinated by a Project Leader (PL) who is tasked with overall project success. The PL receives team members and other resources from the various competency centers that impact the specific project.

The Project Teams are temporary (though often long-term) assignments, terminating when the project is complete. Competency center personnel can be assigned to multiple projects if their time is not fully used on a particular project. At the end of a project, team members return to their competency centers until they are reassigned a new project. In the competency center the employee receives training, works on support teams to assist with other projects, or is temporarily assigned to other competency centers.

The Competency Center Directors and Project Leaders are assisted by a Competency Center Management Team (CCMT) comprised of a Process Improvement Associate (PIA), Personnel Development Associate (PDA), Master Scheduler (MS), and a Futurist. These individuals provide the interface between the competency centers and the project teams, as well as between the various organizational levels. Levels one, two, and three refer to the horizon perspective of the position. For example: the AGO is considered Level 3 and is concerned with far-horizon issues (1-2 years); the Competency Center Directors and Associates are Level Two and are concerned with

mid-horizon issues (30 days to 1 year); the Project Leader and team members are Level One and are concerned with near-horizon issues (1-30 days).

The decision to implement the new organization in April 1992 was based on the Commanding Officer's upcoming change-of-command. It was felt by the Commanding Officer and Executive Director that the new Commanding Officer would be unable to "get up to speed" quickly enough to implement the reorganization before the momentum was lost. The initial implementation was swift. On 14 April, NAWC-ADI was a vertically driven organization. On 15 April, it was a horizontally driven organization.

The Executive Officer completed the reorganization of the Command Staff and special assistants in June 1992. He was given this extra time for two reasons: (1) The staff offices were critical in ensuring the smooth reorganization of the rest of NAWC-ADI in April; and (2) the primary mission of the old and new Command Staffs were not radically different, so the impact of a more gradual reorganization would be more manageable.

The reorganized Command Staff consists of six centers;

- Human Resource Office - formerly Personnel, this center is tasked with people and program development, work force data keeping and personnel actions
- Group Planning - this center conducts special studies, investment and work load analysis, and develops organizational goals and objectives.

- Group Ethics - this center aids in the study of group processes at NAWC-ADI.
- Infrastructure, Health and Safety, and Security Support - this center is in charge of operations and military support, facilities maintenance, safety and security, material management, and legal support.
- Financial Management and Business Services - this center takes care of the accounting, budgeting, project and management support, and planning and resource integration.
- Group Communications - Given the radical nature of the change, this area was tasked with developing and maintaining a system of communications between and within all the many newly-created teams.

C. THE LEVERAGE MODEL

The steering team in charge of developing a new concept of operations chose the "Leverage Process" provided by the Leverage Company (Greenwich, CT) as a model to follow in their restructuring effort. This production-based model provided them an ideal restructuring tool to accomplish their objectives of being a process-oriented, customer-driven organization. To understand the structural issues facing NAWC-ADI, a more detailed description of the leverage process is provided.

1. Pipeline Organization Model²

Leverage predicts that successful corporations of the 21st century will be determined by how well corporate leaders use strategic plans to manage resource rationing, structure their organizations around "value-adding flows," re-engineer pipeline processes, and effectively use performance goals and measures.

Leverage's organizational model is concerned with two resource rationing processes. First, corporations must ration their focus on organizational competencies. As the rate of technological change increases, organizations will not be able to invest in all of their business areas at the same time. If they tried, it would result in uneven development and performance. Large organizations cannot expect to be the industrial leaders in all of their the present enterprises.

Companies must identify which of their competencies are core or strategic, and justify reinvestment, and which competencies are non-core or non-strategic, and must be let go (Nickerson, p.1).

By identifying their core competencies, corporations are better able to maximize the essential processes within their organization. Second, resource rationing must include an analysis of the constraints that most significantly affect

² The Pipeline Model and Leverage Change Process is taken from a paper titled "The Leverage Company" submitted as a class project for MN 4125 by Gary D. Houglan. Additional information has been included in these two sections to better describe Leverage's organizational processes and constraints.

obtaining organizational (strategic) goals in the core competencies. Leverage's model discriminates between four categories of constraints: physical, logistical, managerial, and organizational/behavioral.

Constraint identification is used to determine what is blocking process improvement. The following is a description of the four types of constraints.

- **PHYSICAL CONSTRAINT:** an asset, facility, or capability that cannot meet market demands for quality or quantity, as it is currently operated.
- **LOGISTICAL CONSTRAINT:** a system or procedure by which work is planned, scheduled, assigned, moved through its value-adding steps, inspected, counted, inventoried, shipped and serviced. Logistical constraints cause disrupted flow, long queue times, and unclear ownership of the work in process.
- **MANAGERIAL CONSTRAINT:** a policy, strategy, leadership style, or performance measurement that is used to manage the business, which itself causes the company's change process to slow down or stop. Managerial constraints usually stem from looking at local unit needs in isolation from the dynamics of the entire business.
- **ORGANIZATIONAL OR BEHAVIORAL CONSTRAINT:** Behavior here means "the way we carry out our duties." Usually, when an individual or group acts in a way that slows the change process, they believe they are doing what the business needs or expects them to do. Few people sabotage a change process deliberately. Many do so without realizing it because they do not understand the role they must play for change to be successful. The most universal ROOT CAUSE for such behavioral constraints is an organization structure which does not clearly define roles and responsibilities, and an organization culture which does not require individual accountability. Because these behavioral and organizational forces are inseparable, we combine them in this category of constraints (Naval Avionics Center, p.8).

Leverage summarizes this resource rationing process as follows:

To apply constraint theory, a company must first set goals for competitive performance in the eyes of major customers, define metrics to use for tracking performance against goals, and then force-rank possible constraints to achieving those goals within the time-frames required. It is important to select only one or two top constraints on which to focus resources and investment. Think of these top constraints as leverage points, where the most progress can be made for the lowest investment (Nickerson, p.1).

Central to Leverage's organizational model is the structure of the organization. To effectively address pipeline velocity, organizational processes must be networked among all competency areas involved with the work process. The structure that best supports this networking is a horizontal organization. By eliminating the hierarchical structure within an organization, the functional barriers that impede resource allocation, process design and organizational goal accomplishment are similarly eliminated. The horizontal organization allows for flexible resource allocation (capital and personnel), and moves the decision-making closer to the actual work process pipeline. Resource rationing and organizational restructuring will lead corporate leaders to the essential work processes to be managed. The task then becomes process re-engineering. Leverage identifies three primary processes that corporations will re-engineer: Value-adding pipeline processes, decision processes, and information processes.

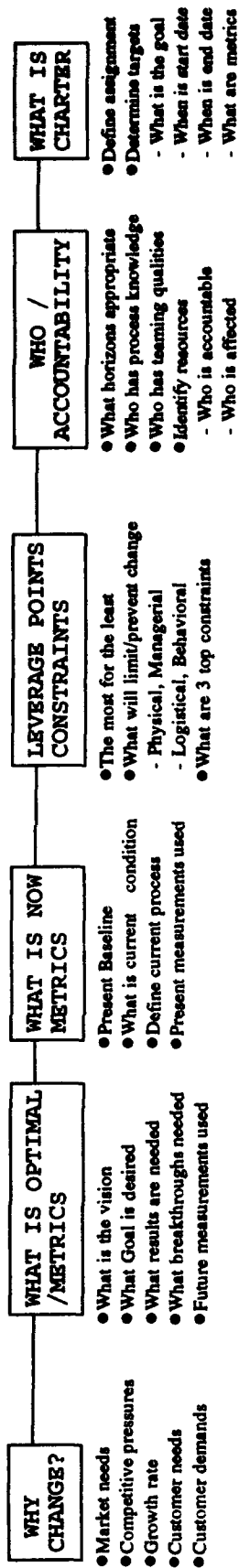
The value-adding pipeline process concentrates on the specific product/service process that is the basis for the organization. In NAWC's case, this covers the entire process of identifying customer need to the receipt of the material by the customer. The decision process involves how the firm organizes to balance the demands and supplies of the organization. It also addresses technical and capital investment issues, personnel development processes, and establishes priorities for process improvement within the organization. The information processes are viewed as the established formal networks to facilitate information flows (such as organizational policy and direction, project team inter-communication, and communication between teams and with organizational leaders).

Keeping the customer's requirements as the focus, the re-engineering is to be done by the people involved with the process ("who own the process"). The re-engineering must account for "quality, speed, flexibility, high asset utilization, rapid cash flow, reliance on value-adding workers to make decisions, and use of information networks by all team members". (Nickerson, p.1)

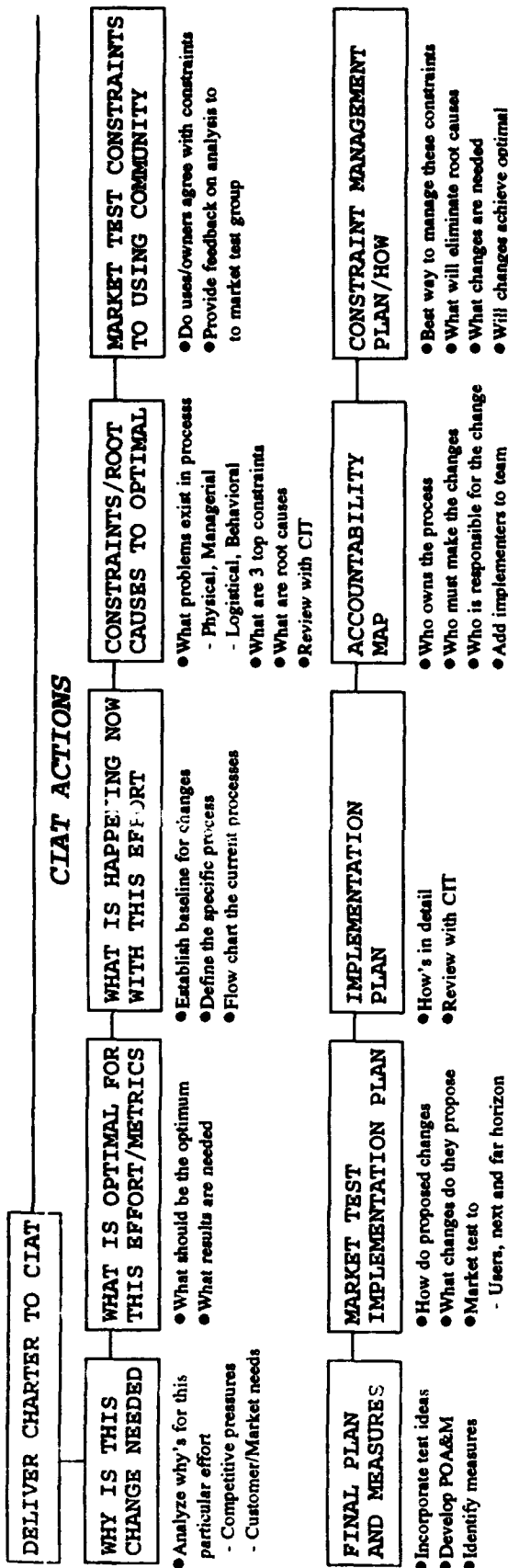
2. Leverage Change Process

A flow chart of the Leverage Change Process is provided in Figure 2-1. The process basically consists of three phases; (1) problem identification and analysis, (2) solution

CIT ACTIONS



CIAT ACTIONS



IMPLEMENTING ORGANIZATION

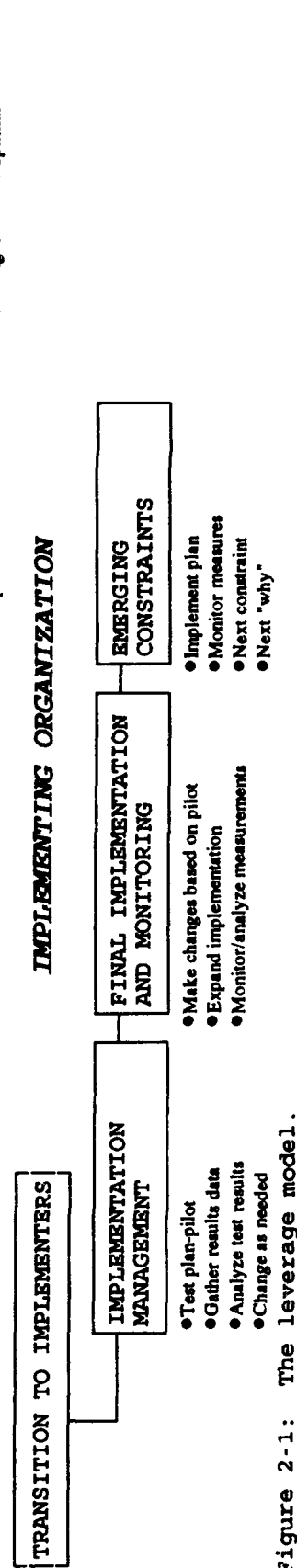


Figure 2-1: The leverage model.

determination and test, and (3) making the required changes happen. A flow chart of the Leverage Change Process is provided in Figure 2-1. The process starts with the Continuous Improvement Team (CIT) identifying and analyzing the problem. The CIT must decide why a change is needed in the organization. It develops the "optimal/metrics" for the overall organization. This vision is compared to the present to provide a baseline assessment. The CIT identifies the top three leverage points or constraints that will limit the move from the present baseline to the optimal. They determine who is accountable based on the process involved and the horizon affected by the change. The CIT defines a charter (Plan of Actions and Milestones (POAM)) to specify goals, targets, start and end dates, and what the metric will be.

The process is then taken over by the Continuous Improvement Action Team (CIAT) to determine and test solutions. The CIAT is concerned with an individual effort to change a process rather than the overall organization. As with the first phase, the CIAT identifies why this particular change is needed, the optimal/metric, the present baseline, and the top constraints to obtaining the optimal outcome. The CIAT then market tests the constraints analysis by obtaining feedback from the users and owners of the process. A plan for managing the constraints is developed to eliminate the root causes preventing the achievement of optimal implementation. An accountability map identifies who owns the process, who is

responsible for the change and who the implementers will be. An implementation plan works out the details of how the change will be implemented. The implementation plan is market tested to determine the effect of the proposed change on the work force and to obtain feedback to refine the implementation plan's POAM and measures.

The third phase is managed by the implementers. First, they pilot test the plan, gather data, and change the plan as necessary. Second, the final plan is implemented and monitored. This process can expand the implementation as new data is identified and it continues to monitor and analyze the measures of the plan. Third, the implementers monitor and address any emerging constraints that may develop that were not part of the original implementation plan. At this point, the process begins again with the next constraint identified for this particular effort.

D. PREVIOUS ORGANIZATIONAL STUDIES

Two sources of organizational information obtained since the reorganization provided additional background to this research. These were a Quality of Work Life (QWL) Survey conducted by NAWC-ADI's Human Resource Office in November 1992 (Hocevar, 1993) and an Employee Feedback Survey (EFS) conducted by NAWC-ADI's Corporate Communications Office in September 1992. (Byron, et al, 1993)

The Quality of Work Life Survey provided information concerning job satisfaction, training, equity and rewards, teams and cooperation, factors impacting ability to do one's job, organizational support for doing things differently, and organizational values and trust. A 57% response rate (402 returned out of 700 distributed) was achieved for the randomly selected sample. Results were separated into three sections; items with the greatest dissatisfaction, items with the greatest satisfaction and open-ended question results.

Items with the greatest dissatisfaction were as follows:

- Participation and planning and policy making
- Management team concern for employee well-being
- Clarity of employee job responsibilities
- Acknowledgement of employee contributions
- Fairness of work assignment
- Ethics and moral values at the Center
- General satisfaction
- Feelings about careers at NAWC-ADI(Hocevar,p.18)

Items with the greatest satisfaction were as follows:

- Meaningfulness of my job
- Valuation of training
- Being informed of the Center's mission/goals
- Center encouragement for other's task completion
- Employee support for the CST concept(Hocevar,p.18)

The open-ended questions in the survey were grouped into two categories; QWL concerns and the impact of restructuring on performance. QWL concerns were:

- Job security and the future of NAWC-ADI
- Lack of clarity regarding career opportunities
- Concerns about promotion fairness
- Communication and clarity of direction particularly regarding the restructuring
- Concerns about leadership and management. (Hocevar, p.17)

The reorganization was seen to have affected the following areas: "lack of role clarity, excessive meetings, too much work as well as too little work, and problems with communication." The reorganization was seen to have improved the following areas: "Removal of barriers allowing greater coordination, opportunities for self-initiative and innovation, and self-management." (Hocevar, p.17)

The Employee Feedback Survey (EFS) questions were divided into three sections; personnel information, organization's structure/objectives, and organization's implementation. The survey was completed by 179 randomly selected employees at NAWC-ADI. An NPS work team grouped the questions into four areas; reorganization, involvement, effectiveness, and communication. The involvement group had the most positive mean, and was comprised of questions designed to evaluate a respondent's sense of belonging to the organization. The effectiveness group had the most negative mean, and asked

respondents to agree or disagree with various statements concerning accountability, personnel development, and confidence in top management.

Items with the greatest disagreement were as follows:

- I participate in the decision making process.
- The organization eliminates internal communication and cooperation barriers.
- The Competency Centers provide effective personnel skill development opportunities.
- The organization provides opportunities for career development and advancement.

Items with the greatest agreement were as follows:

- More teamwork is occurring.
- Teamwork makes others successful.
- The organization's primary focus is customer satisfaction.
- Having a single point of contact for the customer results in better communication. (Byron, 1993)

Both of these surveys identified areas of concern for NAWC-ADI. The apparent lack of information regarding career development opportunities and basic job responsibilities is mentioned several times, along with a general feeling of communication deficiency and being excluded from the decision making processes at the center. These themes are used by the researchers in the development of an Organizational Effectiveness model that forms the foundation for the current research activity.

III. LITERATURE REVIEW

As stated previously, NAWC-ADI identified, through the Leverage Process, that its organizational structure was the major constraint to improving organizational effectiveness. Since the reorganization, NAWC-ADI has become concerned that their communication processes were not operating effectively. A systems approach was chosen to examine NAWC-ADI's organizational components that allow the researcher to observe how the structural change may have affected different systems components including communication processes. Without alignment between its components, an organization will be unable to optimize its effectiveness.

A brief description of systems models will provide a context for examining the primary structural changes that have been implemented at NAWC-ADI: on matrix organizational design and self-managing teams. The matrix section will discuss structural configuration in regards to employee reactions, and possible inefficiencies within matrix organizations. It will identify the need to match organizational norms and values with the matrix structure. Additionally, the preferred basic conditions for a matrix organization, the need for an assimilated organization (of structure, systems, culture and behavior), the characteristics of mature matrix organizations

and the personnel in the organization, and several "pathologies" found in matrix organizations will be presented. The final portion of the matrix section will review articles dealing with research conducted on matrix organizations. The literature on self-managing teams will provide several concepts and factors involved in the effective operation of teams in an organization.

The final section of the literature review will present a set of assumptions, based on the information contained in the literature review, that the researcher would expect to observe in the data collect at NAWC-ADI.

A. ORGANIZATIONAL SYSTEMS MODEL

To understand an organization's ability to change, one must first develop a concept of what an organization is. Beer (1988) states that the critical dimensions of organizational change consists of the amount of dissatisfaction within an organization, the model of the organization, and the process for changing the organization. The effects of the change process are determined by the interaction between these dimensions. (The value of a change must compare the ultimate effects of change with the cost of change). The definition of an organizational model is central to the change process. Without a model, any attempt at analysis is limited by the experience of the manager. The manager's solution may be to solve new problems with solutions that have worked in the

past, instead of analyzing all of the appropriate dimensions.

Beer states,

Too often change efforts to improve the organization specify only one or two of these dimensions, usually strategy and structure, ignoring the behaviors, attitudes and competencies required for the new organization to work. (p. 3)

Authors of organizational systems models agree that organizations are composed of separate components that interact with their environment and among themselves. In discussing organizational models, Lippitt, Langseth, and Mossop (1985) present a "Seven-Box Diagnostic Model for Analyzing an Organization's Needs." The components of the model are as follows; organizational context, outputs (organizational, group and individual), organizational culture, task requirements, formal organization, people, and physical setting and technology. This model allows for interaction between all of the components listed above and provides the researcher with a systematic approach to analyze an organization.

Nadler and Tushman (1991) acknowledge the importance of open-systems theory in making the manager aware of basic organizational models. However, they state:

While systems concepts are useful as an overall perspective, they do not help the manager systematically diagnose specific situations or help him/her apply research results to specific problems. A more concrete model must be developed that takes into account system-theory concepts and processes and helps the manager deal with organizational reality. (p. 548)

Nadler and Tushman's model consists of inputs, transformation processes and outputs. Organizational inputs pertain to environmental inputs, resources, and strategy. The transformation processes involve task components, individual components, organizational arrangements, and the informal organization. The nature of outputs contained in this model include individual behavior and effect, group and intergroup behavior, and system-functioning (how well the system is attaining its goals, utilizing its resources, and adapting).

However, the researcher or manager must not settle for a simple listing of the components contained in a model, but must understand the dynamic relationships between the model's components. The importance of Nadler and Tushman's model lies not in the specific listing of the components, but their concentration on the idea of "congruence."

The model focuses on the critical system characteristic of dependence. Organizations are made up of components or parts that interact with each other. These components exist in states of relative balance, consistency, or "fit" with each other. The different parts of the organization can fit well together and thus function effectively; or fit poorly, leading to problems. Given the central nature of fit in the model, we shall talk about it as a congruence model of organizational behavior, since effectiveness is a function of the congruence of the various components. (p. 548)

This concept of congruence is central to analyzing an organization's effectiveness. The idea of fit is of particular interest to the manager in regard to the

transformation processes since this is where he/she operates.

Nadler and Tushman present a "Congruence Hypothesis."

Other things being equal, the greater the total degree of congruence of fit between the various components, the more effective will be organizational behavior at multiple levels. Effective organizational behavior is defined as behavior which leads to higher levels of goal attainment, utilization of resources, and adaptation. (p. 554)

This implies that if researchers want to understand what is occurring within an organization they must identify the inconsistent fits among the components. In addressing this issue of congruence, the manager must consider how effective their solution will be in correcting problems of fit between components instead of trying to solve a particular problem.

Tichy (1983) identifies similar components in his organizational model. These components or change levers are external interface, mission, strategy, managing organizational mission/strategy processes, task, prescribed networks, organizational processes (communication, problem solving, and decision making), people, and emergent networks.

Tichy's organizational systems model accounts for three additional organizational dynamics; the technical, political, and cultural views. These aspects present different problems for the organization. Tichy summarizes the design problems as follows:

- **The Technical Design Problem:** Organizations face a production problem. Social and technical resources must be arranged to produce desired output.

- **The Political Allocation Problem:** Organizations face an allocation of power and resource problem. The uses to which the organization is put as well as who reaps the benefits.
- **The Cultural/Ideological Mix Problem:** Organizations are held together by a normative glue-- shared beliefs. Organizations must determine what values need to be held by what people. (p. 8)

Tichy refers to the combination of these three aspects as a "strategic rope." He states that it is difficult to determine the differences between the three from casual observation. However, he sees the role of the manager as preventing the unravelling of this strategic rope.

Because of the dynamic nature of organizations, differences exist in the amount of attention and effort given to any one aspect of the organization. This shifting focus results in cyclical manifestations for the technical, political, and cultural aspects of an organization. The role of the manager is to make changes in the organization's components (mission, task, people, etc.) to affect these three systems.

The strategic change management task is to keep the organization internally aligned and aligned with its external environment.Regardless of whether or not it is explicitly and consciously aligned, organizations are proposed to be effective to the extent that there is alignment within each system - technical, political, and cultural - and across the three systems. (Tichy, 1983 pp. 117-118)

The matrix of components (change levers) and the management areas (technical, political, and cultural) present the manager with the ongoing task of seeking to align all aspects of the

organization to reduce the levels of uncertainty within and between each system. As a result of its cyclic nature, uncertainty in the systems will occur at different times. A response is triggered to address the specific problem. According to Tichy, this response will affect all three systems and must be considered in light of its effect on strategic alignment.

Systems models provide the researcher with a much broader view of organizations than previous classical bureaucratic models or the human relations models. In addition to identifying diverse components within an organization, systems models highlight the importance of congruence or strategic alignment between the components.

B. MATRIX ORGANIZATIONS

A major component of organizational systems is the coordinating mechanism that provides the framework for organizational activity. Mintzberg (1983) concluded that mechanisms and parameters fall into "natural clusters, or configurations."

Now we take up the configuration hypothesis, which postulates that effective organizations achieve an internal consistency among their design parameters as well as compatibility with their situational factors - in effect, configuration. (p. 152)

Mintzberg identifies five separate configurations of structure and situation: Simple Structure, Machine Bureaucracy, Professional Bureaucracy, Divisionalized Form, and Adhocracy.

He states that organizations do not merely react to situational factors, but must be seen from the systems approach as being "gestalts" that interact among themselves and with their environment.

Organizations that are complex and dynamic and seek to capitalize on innovation and creativity represent an Adhocracy configuration.

In Adhocracy, we have a ... highly organic structure, with little formalization of behavior; high horizontal job specialization based on formal training; a tendency to group the specialists in functional units for housekeeping purposes but to deploy them in small, market-based project teams to do their work; a reliance on the liaison devices to encourage mutual adjustment, the key coordination mechanism, within and between these teams; and selective decentralization to and within these teams, which are located at various places in the organization and involve various mixtures of line managers and staff and operating experts. (p. 254)

The Adhocracy tends to ignore the traditional unity of command aspect of organizations and group activities into matrix structures. Concentrating on its client's problems, operating and administrative requirements are "blended into a single effort." In this configuration functional, project and integrating managers serve as liaison devices between groups.

Strategic issues are addressed lower in this configuration than others. As such, top managers are occupied with monitoring projects, acting as a liaison with the external environment, and dealing with the problems that might surface as a result of the fluid nature of Adhocracies. The conditions of an Adhocracy is that it is dynamic and complex.

This complexity encourages the organization to develop "differentiated work constellations" to address the different and frequent product changes faced by the organization.

Mintzberg notes three issues that are associated with Adhocracy. First, people may have negative reactions to the ambiguity and conflict found in the Adhocracy. While it does provide for greater "democracy with less bureaucracy," the dynamic nature of a ever-changing organization does take its toll on personnel.

Second, inefficiencies may develop in the Adhocracy. If used to accomplish "ordinary things," it will not be as efficient as other configurations. The Adhocracy is designed to address complex and dynamic issues. This requires greater communication and this has a time and financial cost associated with it. Additionally, unbalanced workloads may exist between the periods when one project is ending and before another project starts. This temporary excess capacity can result in a drain on cash reserves.

Third, faced with the conflict, ambiguity, and perceived inefficiencies, some organizations may try to transition to a more bureaucratic configuration. This reversion to more traditional forms will not lead to increased effectiveness if the goal of standard policies and operating procedures is achieved at the cost of aligning the organization's configuration with its internal and external environment.

Bartlett and Ghoshal (1992) have stated that the problems faced by a matrix organization are not one of goals, but one of process:

The problem was that they defined their organizational objectives in purely structural terms. Yet the term formal structure describes only the organization's basic anatomy. Companies must also concern themselves with organizational physiology - the systems and relationships that allow the lifeblood of information to flow through the organization. They also need to develop a healthy organizational psychology - the shared norms, values, and beliefs that shape the way individual managers think and act. (p. 372)

Bartlett and Ghoshal state that an organization's corporate vision must be clearly communicated, personnel must identify with the corporate goals resulting from the vision, and personnel must be developed to integrate their thinking and activities into the larger corporate agenda. The goal is expressed by a senior executive they interviewed: "The challenge is not so much to build a matrix structure as it is to create a matrix in the minds of our managers." (p. 380)

Davis and Lawrence (1977) have provided an extensive overview of matrix organizations. They define matrix organizations as:

any organization that employs a multiple command system that includes not only a multiple command structure but also related support mechanisms and an associated organizational culture and behavior pattern. (p. 3)

Davis and Lawrence state that a matrix structure is preferred when three basic conditions exist simultaneously. As outside pressures develop for dual focus on such issues as function,

product, or location, a dual command structure is needed to provide for a balance of power between the different focus areas. The pressure for high information-processing capacity is also a condition of matrix development. As uncertainty in the external environment, complexity of organizational tasks, and the interdependency among organizational groups increase the need for high information-processing capacity increases. The third basic condition for matrix adoption is increased pressure for shared resources. Pressures of economies of scale require a system to maximize scarce resources. The matrix organization provides flexibility by allowing personnel and machinery to be shifted from project to project to meet organizational demands.

For Davis and Lawrence a matrix organization is more than structure, they include "Matrix Structure + Matrix Systems + Matrix Cultural + Matrix Behavior." All four components are required to adequately address the basic conditions listed above by:

- (1) the focusing of undivided human effort on two (or more) essential organizational tasks simultaneously,
- (2) the human processing of a great deal of information and the commitment of the organization to a balanced reasoned response (a general management response), and
- (3) the rapid redeployment of human resources to various projects, products, services, clients, or markets. (p. 21)

This can only be accomplished if all aspects have been assimilated into the total matrix organization.

Mature matrix processes involve power shifts from old hierarchical structures to dual command structures, location shifts from functional to project arrangements, and a focus on product innovation. Flexibility is the key characteristic of matrix organizations. They capitalize on the economies of scale provided by larger organizations, while utilizing the creativity of smaller project teams. As the organization learns to combine, focus, and refocus all aspects of the organization, resistance to change is decreased.

The role of management within the matrix organization is different than other organizational configurations. The top leadership role is to balance power within the dual command structure, manage the decision making context, and to set the standards of acceptable performance and behavior. The matrix area bosses (functional and project) must develop new managerial perspectives. Recognizing that they have lost some control over production units, functional managers focus on establishing communication channels with the project managers to become more customer-oriented. The project manager assumes a general executive approach to management. They must integrate all functional members into one team in the interest of the project. This integration is accomplished through influencing, persuasion, and communicating instead of direct authority since authority is shared with the functional manager. The most challenging position is that of the 2-boss manager. Given that they are held accountable by the

functional manager and the project manager, the potential for conflict is high. However, by assuming a general management perspective the 2-boss manager is capable of influencing the organization to a much greater extent than in the hierarchical organization, they have two organizational avenues instead of one.

Matrix organizations place greater demands on individuals than other configurations. The success of a matrix will relate directly to how well the organization helps its personnel function in the new system. Because of increased interaction and communication, diversity within the organization will surface more often. This diversity will lead to conflicts between individuals and it must be confronted. The conflict is not a problem; it is the manner in which it is dealt with. Conflict management skills are essential for matrix organization.

The assumption in a matrix is that this conflict can be healthy and that higher quality solutions will develop if people with different expertise and orientations relating to a given task get together and thrash out their differences. (Davis and Lawrence, p. 104)

Individuals are required to collaborate more frequently in a matrix. For effective collaboration to occur, trust must be developed throughout the organization (horizontally and vertically). Open relationships built on trust must be actively developed. Individuals throughout the organization have to be capable of utilizing sophisticated problem solving

skills. Normally only required of top managers, matrix organizations mandate that the lowest levels make corporate decisions. Lower level managers are faced with analyzing qualitative and quantitative corporate information, and weighing short and long range considerations in an environment full of uncertainty.

Not all individuals may be capable of adjusting to matrix organizations. The organization has the responsibility to develop its personnel.

It is not sufficient to merely tell people that they will be shifting from being a conventional line manager to a manager in a matrix. If they are to be effective, they must quickly build effective working relationships with the others in the matrix. It is too risky to let chance events in their contact form the character and process of the group. (Davis and Lawrence, p. 109)

Davis and Lawrence feel that team building will assist the team in understanding the common expectations of all members. Such issues as group objectives, meeting times, roles and responsibilities of members, leadership roles, decision making procedures, conflict resolution, and interactions with functional areas should be clarified at the outset of team development. Individually, managers need to receive training in management philosophy, matrix organizations, effective communication, group processes, and new business skills (corporate processes such as project funding and budgeting). Simulations and monitored teambuilding will augment the learning process. The organization reinforces the matrix

concept through its selection criteria, performance appraisals, and career development. A matrix is a stressful environment, but with individual and group training (plus organizational reinforcement) individuals obtain greater levels of freedom and power. This new freedom can lead to heightened levels of commitment and motivation that results in higher individual productivity and greater organizational effectiveness.

Davis and Lawrence have identified several common pathologies in matrix organizations. "Power Struggles" are more common, because shared power is inherent in matrices. The role of balanced power is essential to prevent power struggles.

If processes are not controlled or informal processes are allowed to coordinate critical tasks, "Anarchy" may result. This comes from a lack of appreciation that a matrix is a "definite structure and not a 'free form' organization." (Davis, p. 133) Critical tasks require explicit arrangements.

"Groupitis" can develop if the idea of matrix is understood to mean that all project decisions must be made by a unanimous vote during group meetings. To prevent this, groups must be trained in the characteristics of matrix organizations and develop ground rules during the teambuilding stage regarding decision processes.

"Collapse during economic crunch" also occurs to matrix organizations. The only preventive measure for this is

management commitment. If the organization is not going to be committed, it is much better not to engage in matrix operations. Once management retreats from their commitment, it will not be able to return to a matrix system because trust in management is essential in matrix organizations.

"Excess overhead" has been found in the early stages of matrix development; however these costs disappear as the matrix matures. Management does contribute to this problem by filling every position with full-time employees. Assigning managers to multiple roles can reduce overhead cost.

"Decision strangulation" may occur in matrix organizations due to constantly clearing decisions through the functional areas, escalating all conflicts to higher levels, and reliance on unilateral decision style by one manager. To prevent clearing decisions, team members must be empowered by the functional areas to make decisions, otherwise there is no need for a matrix system. Managers must reinforce the necessity of conflict management at the lower levels by requiring individuals to solve any problem that belongs in their sphere of responsibility. To prevent unilateral decision making from interfering with the decision process, the organization must ensure that managers understand that bilateral decision making is the accepted practice. Anyone who is operating in a unilateral style, "must rework their concept of decision making or look for employment in a non-matrix organization." (Davis, p. 140)

"Sinking" reflects an organization that has trouble maintaining the matrix at higher levels, but has been incorporated at the lower levels. This will result in confusion, miscommunication, and frustration. To prevent this, a complete conceptualization of the matrix organization must be developed and implemented.

"Layering" is when the matrix fever begins to take over all aspects of an organization regardless of effectiveness. Matrices within matrices can become more of a burden than the problem they were designed to correct. Again, an adequate conceptualization will prevent this from occurring.

"Navel gazing" refers to an organization who has lost touch with the outside world (or customer), because of focusing solely on its internal disputes. Generally, this is the result of having to address other pathologies. By preventing those other problems from occurring, less attention will be focused internally.

Mintzberg, Bartlett and Ghoshal, and Davis and Lawrence have provided a conceptual overview of matrix organizations. The remaining portion of this section will address research articles regarding matrix organizations and project groups working in research and development arenas.

Burns and Wholey (1993) addressed the reasons that organizations adopt and abandon matrix management programs. They examined 1,375 hospitals that had been involved in matrix programs. They found that for those hospitals adopting a

matrix program, external factors (such as the prestige of the organization within its professional network, regional pressure by hospitals that had already adopted matrix programs, and the degree of status conferred on the organization by its professional network) played a significant role in the organizations studied. In addition to influencing technological innovation, external organizational networks influenced administrative innovation. This relates to the status and prestige that can result from implementing a program that is favored by the professional circle of the organization. Internal factors are dominant in deciding to abandon a matrix program. Financial problems, staffing problems (such as turnover and development), and political opposition were the leading dynamics involved in the abandonment of matrix programs. A special note was provided by Burns and Wholey in regard to political opposition by the lower-level managers. Plant managers and first line supervisors may view the transfer of power to project teams as a loss of power. They may resent having to work with team members in "collegial, consultative relationships."

Joyce (1986), conducting a social experiment in the effects of matrix structure, determined communication processes, role perceptions, and work attitudes were affected by the introduction of a matrix structure into an engineering division of an aircraft manufacturing firm. Three groups within the engineering division were studied; engineering (33

participants), drafting (21 participants), and a control group (25 participants). The key variable explaining the degree of variance in communication, roles and attitudes was the amount of change implemented by the matrix. For example, the less familiar the division was with team assignments, the greater the physical relocation, and the more abrupt the introduction, the greater the negative impact on the organization. In regard to communication, frequency did increase, but quality (as it pertains to participative and directive behavior of participants toward problem solving) was rated as lower by one of the two divisions studied:

Although the reorganization brought predicted improvements in the quantity of communications in one experimental group, the change unfavorably affected the quality of communications, and corresponding decreases in coordination occurred. This suggests that implementing a matrix structure must favorably affect both quantity and quality of communications for it to result in such desirable outcomes as improved coordination. (Joyce, p. 552)

After six months, role ambiguity, job involvement, satisfaction with; work, supervision, co-workers, pay and promotions all showed slight decreases for one group (engineers) and sharp decreases for the group (drafters) which experienced greater upheaval in the implementation.

Addressing the balance of power in matrix organizations, Katz and Allen (1985) determined that a clear distinction was needed between the project and functional manager. Deriving their data from the study of nine R&D organizations (public and private) they determined that instead of attempting to

equalize the power of each manager, the differences in their positions required them to have different spheres of influence. The only joint aspects of their influence should be in the areas of salaries and promotions. The project manager must be concerned with the outside pressures of the customer and the coordination of the different functional representatives on the project. The functional manager has to concentrate on the technical aspects of his/her specific area to ensure that excellence and state of the art technology supports the project.

The findings imply that it is not through mutual balance or joint responsibilities along single dimensions of influence that the matrix should be made to work, but rather that the matrix should be designed and organized around more explicit role differentiation among dimensions of influence. (Katz and Allen, p. 84)

Barker, Tjosvold, and Andrews (1988) investigated the role of conflict management on matrix organizations among 315 engineers and technologists in a western Canada utility firm. They determined that those managers who were co-operative and confirming of conflict were more successful in handling conflict than those who tried to compete with it or avoid it.

These damaging effects of conflict are much more likely to occur when a project manager attempts to win conflicts when that is possible (competitive mode). Conversely, the constructive effects of conflict are much more apt to occur when a project manager confirms the competence of the team members (confirming mode) and establishes a win - win atmosphere where people argue freely about the best ways to attain the essential goals of all persons involved (co-operative mode). (p. 176)

Barker and Tjosvold suggest that it is not essential for every project manager to have the qualities described above, but they must ensure that someone on the team does have these qualities and is given the leeway to manage team conflict.

In studying 32 project groups in a R&D division of a major corporation, Keller (1986) determined that group cohesiveness was the best predictor of project team performance.

The findings suggest that cohesive project groups were able to achieve high project quality and meet their goals on budgets and schedules. (p. 723)

Innovative orientation, as determined by an adaption-innovation inventory to measure "ability to do things differently," was also an important predictor of project quality, but did not appear to be important for budgeting and scheduling performance. The importance of group cohesiveness suggests that team development, physical location, supportive leadership, and stable group memberships should be facilitated by the organization to increase project performance.

C. SELF-MANAGING WORK TEAMS

Self-managing work teams are specialized work teams. Self-managing teams can arrange schedules, hire and fire team members, manage budgets, and deal with customers. Since its basic premise is to have the team manage itself, the requirement for lower and middle management decreases. In today's environment of downsizing and streamlining, creating

self-managing teams is seen as a good way to reduce labor cost while increasing efficiency.

The benefits accrued in efficiency basically stem from three factors. First, many of the tasks performed today are complex and involved, far exceeding the capabilities of an individual. Assembling an automobile, building a house, or providing dry cleaning service are all examples of tasks which are better accomplished using teams.

Second, employee motivation levels in teams are generally higher than when working alone. There are several theories describing this phenomenon. A classic example is Herzberg's motivational model for teams. Herzberg's model is based on two elements labeled **Hygiene factors** (items that cause job dissatisfaction) and **Motivation factors** (items that create job satisfaction). Hygiene factors include interpersonal relationships, supervision levels, and status. Motivation factors include responsibility, individual growth, and recognition. Herzberg theorized that if job dissatisfiers were minimized and job satisfiers were maximized, morale and individual job satisfaction would be high, leading to high productivity and profit levels (Donnelly, 1992, pp.315-316).

Third, given the right conditions, a cohesive collection of personnel can produce better results than the sum of their individual efforts (a synergistic benefit). The conditions necessary to derive this particular benefit are many and varied, including selection and training of team members,

empowerment of the team, and proper facilitation processes.
(Hackman, 1983)

There are some factors to consider when considering the implementation of self-managing groups. Manz, Keating, and Donnellon (1990) identified several themes that surfaced during their research on the struggles of managers during their transition toward having workers manage themselves:

- Initial suspicion, uncertainty, and resistance
- Gradual realization of the positive possibilities inherent in the new system
- Wrestling with a new role
- Learning a new language.

They further caution that:

any organization considering the adoption of self-managing work teams would be well advised to spend considerable time and effort in facilitating this important transition. (p.26)

Self-managing groups are rated higher in quality of work life outcomes than traditionally-managed groups. They generally report significantly higher levels of job satisfaction, growth satisfaction, social satisfaction, group satisfaction, trust, and perceptions of positive change. Employee ratings of group performance effectiveness by self-managing teams were found to be significantly higher than the ratings of performance by the matched traditionally managed groups. (Cohen and Ledford, 1991)

However, the mere formation of these teams is not enough. Because teams are composed of individuals, it requires the

organization to consider the needs of its members when designing the teams. One of the most important of these aspects is intrinsic motivation. Thomas and Velthouse (1990) proposed that four dimensions of task assessment are included as cognitive components of intrinsic motivation; impact, competence, meaningfulness and choice. These four dimensions are a synthesis of several theories, including Deci (1975) and Hackman and Oldham (1980). The following is a more complete description of these dimensions:

- **IMPACT** - This dimension refers to the degree to which each individual sees his/her behavior making a difference in terms of accomplishing the task at hand. Within the Hackman and Oldham model of job redesign, impact is analogous to the knowledge of results. Also called PROGRESS in further studies (Thomas and Velthouse, 1990).
- **COMPETENCE** - This refers to the extent to which individuals can perform a task skillfully when necessary. Low perceptions of competence in individuals can lead to avoidance behavior in situations requiring the relevant skills. In a team-based organization, this can lead to inefficiency and lowered productivity.
- **MEANINGFULNESS** - This dimension refers to an individual's assessment of a task's value in relation to his/her own priorities. Simply put, it is how much a person cares about a task. There is an obvious correlation between this dimension and intrinsic motivation. Low levels of task meaningfulness can lead to apathy, whereas high levels can result in commitment, involvement and concentration of energy (Kanter, 1968; Thomas and Velthouse, 1990).
- **CHOICE** - This dimension involves the concept that a person's behavior is perceived as self-determined. There is general agreement in the literature that seeing oneself as the "locus of causality" (deCharms, 1968) is the fundamental requirement for intrinsic motivation. Deci and Ryan (1985, p.105) proposed that "the central issue in self-determination is the experience of choice."

Behavioral scientists have determined that there are three psychological states needed to stimulate and motivate individuals in groups:

- The project the group is undertaking must be meaningful, important, and worthwhile to the group by their value system.
- The group must believe they are going to be held personally responsible for the outcome of their project.
- On some regular basis, the group needs to be able to determine the outcome of their efforts. (Hackman, 1975, p.630)

Hackman and Oldham developed five core job dimensions that directly impact upon these states. For a task to have meaning, it requires variety, identity, and significance; the first three core dimensions. Skill variety is the extent to which a group uses its collective skills and abilities to complete a certain activity. The more skills and abilities the group uses, the more meaningful the activity is to the group. Task identity refers to how complete and identifiable the task is. The easier it is to identify the outcome and its impact, the more purpose associated with the task. Task significance refers to how important the task is perceived as being to others. If the team feels the task is significant, this will increase the desire to produce enhanced outcomes (Hackman, 1975, pp.631-632). These three core job dimensions greatly impact upon the meaning associated with the task. Increase any or all of them, and the meaning of the team's

activities will increase, thus increasing the individual's concern for a quality product.

To stimulate a team's responsibility for the final outcome of their product, Hackman and Oldham devised a fourth dimension; autonomy. Autonomy refers to the degree of freedom, discretion, and independence the team can employ in determining how the product will be produced (Hackman, 1975, p.632). The more autonomy given, the more responsibility developed by the team. They can no longer blame failure on limitations imposed by outside forces.

The last job dimension developed by Hackman and Oldham is feedback. Feedback refers to the amount of information a team receives as to the quality of their efforts. When a team is responsible for their own quality control, feedback on the effectiveness of their system is immediate and team members can initiate any needed adjustments to enhance quality production. (Hackman, 1975, p.632)

From the earlier discussion of self managed work teams, these five dimensions seem to be present by design. The product produced by each team is a whole, or in some cases, an end product that will assemble with others to form a whole. This demonstrates task identity. Each team's task is significant since its product or service is desired by a customer who is willing to accept and/or purchase it. This is task significance. Teams schedule work, maintain inventories, establish productivity targets, and devise strategy. This is

an example of autonomy. Finally, because quality control and customer service are handled by the team, feedback occurs immediately, satisfying the last dimension of Hackman and Oldham's model.

Hackman (1983) proposed a normative model of group effectiveness (Figure 3-1) that formed the beginnings of an Action model of group effectiveness, the focus being what one would actually do to create and maintain an effective work team. These types of models are especially helpful in

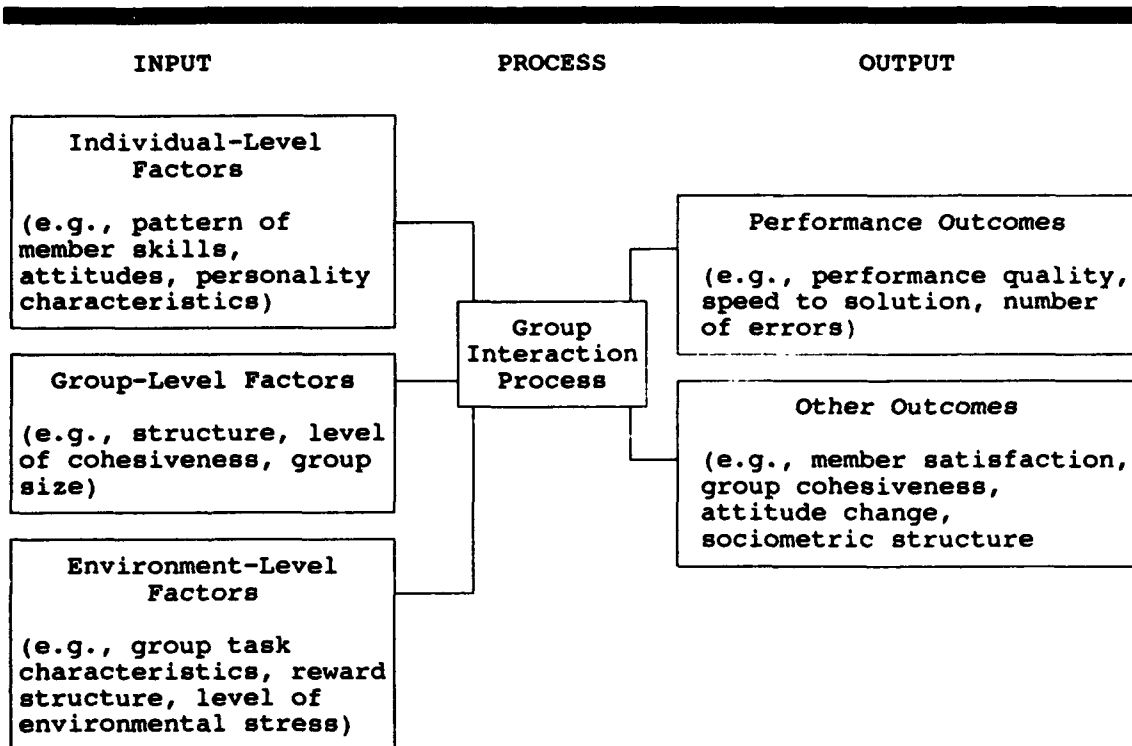


Figure 3-1: An input-process-output framework for analyzing group behavior and performance.

organizing, summarizing, and integrating empirical research on group behavior. Hackman's normative model uses three criteria to assess team effectiveness:

- Productive output should be greater than the performance standards of people who receive the output.
- Social processes used in carrying out the work should maintain or enhance the capability of members to work together on subsequent team tasks.
- Group experience should satisfy rather than frustrate the personal needs of group members.

A variation of this model is used in this thesis to evaluate the organizational effectiveness of NAWC-ADI.

Ancona and Caldwell (1990) have done extensive research in the area of "boundary management," the process by which teams manage their interactions with other parts of the organization. This process deals not only with communication or interactions that the team initiates but also to how the team responds to input from others. They separate team members' behavior into four distinct patterns of activity:

- AMBASSADOR - activities directed at representing the team to others and protecting the team from interference. Usually aimed at the upper levels of the organization.
- TASK COORDINATOR - activities aimed at coordinating the team's efforts with others. People taking on these activities communicate laterally rather than up the organization. (Also called SENTRY in further studies).
- SCOUT - activities aimed at obtaining information for the group. These are most important in the early stages of the group's formation.
- GUARD - activities aimed at keeping information and resources inside the group.

It was discovered that high-performing product development teams generally carry out more external activity than low-performing teams. More specifically:

...high levels of Scout activity are only important early in the process, while ambassador and task coordinator activity remain linked to performance throughout the product development cycle. Members of high performing teams did not simply react to communications from others; they were more likely to be the initiators of communication with outsiders than those individuals on low-performing teams. (Ancona and Caldwell, 1990)

The specificity of group goals and accuracy of performance feedback have been found to increase work group cohesiveness (Koch, 1979). Cohesiveness, in turn, has been positively linked to performance in self-managing work teams (O'Keefe, Kernaghan, and Rubenstein, 1975). Cohesiveness based on team members' attraction to the task may improve their commitment to group goals, their ability to coordinate through common understanding, and their level of participation in group process. This improved level of commitment to group goal accomplishment should lead to increased effectiveness (Goodman, Ravelin, and Schminke, 1987).

O'Reilly and Roberts (1977) examined small- to medium-sized (3-53) groups in Naval Aviation Units and found that as group size increased, group connectedness decreased. Another important finding was that information accuracy and communication openness were strongly related to group effectiveness.

A variation of self-managing teams is a multi-functional project team. Multi-functional project teams are necessary to deal with problems of "organized complexity;" those problems which cut across functional areas and for which multiple but independent functional solutions are not adequate. These problems require the integration of input from members of multiple functional areas. Thus, in contrast to problems of "disorganized complexity" which can be partitioned into single discipline components, solved, and assembled to produce a whole solution, problems of organized complexity require that individuals from several functional areas work together throughout the problem solving process to produce integrated multi-functional definitions and solutions to problems.

Multi-disciplinary team structure is based on dual assignments of organizational members to both functional areas (competency centers at NAWC-ADI) and project teams. Individuals may be involved in one or more project teams at a time, while continuing to report to their competency center. As a result, members operating in this design system may have multiple reporting relationships.

These team members are also not able to cover the work of the other team members since they do not have the technical backgrounds in all of the discipline areas which are represented on the project team. Because of this it is important that all team members contribute to the work of the project team. Individual team members become responsible for

their own area of expertise and their collaboration with other team members to integrate their discipline area into the problem-solving processes of the project team. (Uhl-Bien and Graen, 1991)

There are limitations to self-managing and multi-functional teams. Costs will go down from improved quality and the reduction in supervision required, but additional human resource costs will appear, primarily in the area of the additional training that will be required. Team members need the skills necessary to be cross-functional and flexible within their own team. Training in group processes and effective teamwork is vital to the success of self-managing teams. Group process training is expensive and time-consuming. If a skill-based pay system is used, salary expenses go up resulting from increased training provided. Other limitations include:

- If an organization is composed of teams and non-team units, conflict between the two different structures may occur.
- Meetings become lengthy and time-consuming, therefore slowing down the decision making process.
- Individual expectations of team members for a perfect setting may be too high and could result in personal frustration.
- Teamwork is demanding on individuals as cooperation is needed between team members. Personal ideas and philosophies must be in sync or put aside for teams to function (Lawler, pp. 111-113).

With these limitations in mind, managers must decide whether or not to use self-managing teams, and determine the degree to which the teams should be self-managing.

D. HYPOTHESES

The purpose of the survey was to conduct an analysis of variables generally associated with the performance of project groups. A set of hypotheses, based on the literature review and the intuitive insight of the NPS research group, was used to generate a model of organizational effectiveness. It was hypothesized that independent variables such as role clarity, support for innovativeness, and organizational communication would be positively correlated with intermediate process variables (empowerment, intergroup cooperation, and team cohesiveness). The groupings of independent and process variables were hypothesized to have positive correlations with outcome variables such as job satisfaction, perceived levels of influence (individual and team), customer service and quality of work. Finally, the literature does not discuss explicitly the link between specific types of communication and information and the variables of organizational effectiveness in a context of a team-based matrix structure. Therefore this research takes an exploratory approach to examining the relationship between information availability and organizational effectiveness.

IV. METHODOLOGY

A. QUESTIONNAIRE DESIGN

Using themes extracted from an initial examination of interviews conducted at NAWC-ADI (Houglan, 1993), a preliminary communication process model was used to categorize the themes as independent variables, communications processes, or outcomes (Appendix D).

As part of a large-scale study, a questionnaire was designed to accomplish the broad objective of performing a communication audit of NAWC-ADI. This thesis will provide results and analysis of a subset of the data generated by this survey. The focus of this research is the constructs used to evaluate NAWC-ADI's organizational effectiveness in its new matrix structure, and a further evaluation of the relation of the information availability items to the organizational effectiveness constructs.

Previous research provided some of the survey questions and constructs used in this research and the remainder were developed by the research team. The focus of these constructs was to evaluate employee perceptions of organizational, team, individual, and communication issues derived from interview themes at NAWC-ADI. The items were arranged into nine sections, as follows:

- **DEMOGRAPHIC INFORMATION** - Background (7 items).
- **SECTION I. TASK CHARACTERISTICS** (41 items) - This section contains questions making up constructs measuring empowerment (individual and team), role clarity and conflict, task complexity, organizational commitment, and job satisfaction.
- **SECTION II. ORGANIZATIONAL CHARACTERISTICS** (28 items) - This section contains items for constructs measuring organizational effectiveness and values, innovation, intergroup coordination and cooperation, and matrix organization diagnostics.
- **SECTION III. TEAMWORK** (27 items) - Contains questions used to measure the affirmative, generative, collaborative, integrative, and expansive elements of teamwork.
- **SECTION IV. PROBLEM IDENTIFICATION** (16 items) - Contains questions aimed at discovering variances in processes common to teams (Purser, 1990, p.307-308).
- **SECTION V. COMMUNICATION** (29 items) - Contains items for constructs measuring performance feedback, organizational communications and boundary management.
- **SECTION VI. INFORMATION AVAILABILITY** (14 items) - Contains questions to evaluate the sufficiency and satisfaction with information related to the individual (e.g. performance feedback), the task (e.g. technical information) and the organization (e.g. policies).
- **SECTION VII. INFORMATION SOURCES** (21 items) - Contains questions to determine the utilization, accessibility, and reliability of various information sources at NAWC-ADI (format from Purser, 1990, p.302-303).
- **SECTION VIII. ADAPTABILITY AND INFLUENCE** (18 items) - Contains questions to evaluate the level of perceived individual and organizational adaptability and influence existing at NAWC-ADI as well as outcomes "since the reorganization" and "in the past six months."

The complete questionnaire is shown in Appendix E. Response scales varied from a four-point to a five-point Likert-type format. The final draft of the survey was piloted at the Naval Postgraduate School. Twelve students from the Manpower,

Personnel, and Training Analysis curriculum participated in the pilot study.

B. QUESTIONNAIRE ADMINISTRATION

The NPS team requested that NAWC-ADI identify and administer the questionnaire to a ten percent sample from each competency center (or at least ten personnel in the smaller competency centers). The research team also requested that they survey 100 percent of the level two and three personnel. NAWC-ADI identified the actual personnel to respond to the questionnaire and generated a cover sheet for each questionnaire with the respondent's name on a label (an example is provided in Appendix F). A total of 850 questionnaires were distributed. Completed questionnaires were returned by 454 individuals, yielding an overall response rate of approximately 53 percent. Response rates for levels one, two, and three were 29.5, 66.6, and 75.0 percent, respectively.

C. STATISTICAL DATA ANALYSIS

1. Preliminary Data Analysis

The data from the questionnaires were manually entered into a data base and analyzed using the Statistical Package for the Social Sciences (SPSS) software package. A significant percentage of respondents from each directorate failed to indicate their specific competency center

assignment, making representative sample computations by this demographic variable difficult. However, we received at least two surveys from each competency center, so part of the original goal was achieved. Complete response data and the representation of NAWC-ADI personnel by directorate and level are presented in Table 4-1. The overall representation is 14.3 percent, therefore achieving the goal of at least a 10 percent sample. However, the data indicate a disproportionately large number of Project Office personnel in the sample. This is due to the fact that this group has a greater proportion of level two and three personnel which we attempted to sample at 100 percent. The goal of sampling 100% of the Level two and three personnel was not achieved, but at least two thirds of this population responded.

Roughly 50 percent of the respondents have worked at NAWC-ADI for more than ten years, with the largest group of respondents in the five-ten year category (38.5%). It is also interesting to note that 25 percent of the respondents have been there for more than twenty years. This was perhaps a side effect of sampling all of the level two and three personnel. Complete demographic frequencies are presented in Appendix G.

TABLE 4-1
REPRESENTATION OF SURVEY RESPONDENTS FROM NAWC-ADI
(BY DIRECTORATE AND LEVEL)

		ONE	TWO	THREE	UNK	TOTAL
ALPHA	RESPONDENTS	26	22	7	24	79
	NAWC-ADI TOTAL	810	36	7	--	853
	REPRESENTATION	3.2%	61.1%	100%		9.3%
BETA	RESPONDENTS	30	47	4	14	95
	NAWC-ADI TOTAL	1124	70	6	--	1200
	REPRESENTATION	2.7%	67.1%	66.6%		7.9%
GAMMA	RESPONDENTS	28	22	5	7	62
	NAWC-ADI TOTAL	314	31	5	--	350
	REPRESENTATION	8.9%	71%	100%		17.7%
PROJECT OFFICE	RESPONDENTS	44	27	3	32	71
	NAWC-ADI TOTAL	138	29	8	--	175
	REPRESENTATION	31.8%	93.1%	37.5%		40.6%
COMMAND STAFF	RESPONDENTS	44	18	13	6	116
	NAWC-ADI TOTAL	543	39	18	--	600
	REPRESENTATION	8.1%	46.2%	72.2%		19.3%
UNKNOWN	RESPONDENTS	5	2	1	23	31
TOTAL	RESPONDENTS	177	138	33	106	454
	NAWC-ADI TOTAL	2929	207	44	--	3178
	REPRESENTATION	6.0%	66.6%	75.0%		14.3%

2. Data Reduction

To efficiently analyze the data, it was necessary to identify a small number of scaled variables relevant to the research questions. A priori groupings of items were formed that were believed to measure the variables outlined in the discussion of questionnaire design (see section A of this

chapter). Items that are worded in the opposite direction to the construct were reverse-coded (See OC17R in Table 4-2 for an example).

Reliability coefficients (Cronbach's alpha) were calculated on scaled variables to determine their internal consistency. In all cases the resulting coefficients were sufficiently high to justify the use of the construct in further analysis. Tables 4-2, 4-3, and 4-4 provide the constructs, alpha coefficients, and specific questions in each construct. The constructs are categorized separated by the previously mentioned grouping of independent variables, intermediate process variables, and outcome variables.

TABLE 4-2
INDEPENDENT VARIABLES:
CONSTRUCTS, ALPHA COEFFICIENTS, AND SPECIFIC QUESTIONS

ROLE CLARITY $\alpha=.75$

- TC20. I feel certain about how much authority I have.
- TC21. Clear, planned goals and objectives exist for my job.
- TC23. I know exactly what is expected of me.
- TC39. I know my job responsibilities.

SUPPORT FOR INNOVATION $\alpha=.85$

- OC9. The organization supports personnel in pursuing new opportunities.
- OC10. The organization supports personnel in trying new ways of doing things.
- OC15. Taking initiative is rewarded at NAWC-ADI.
- OC17R. People who offer new ideas are likely to get clobbered.
- OC24. This organization encourages me to share ideas I have about ways to improve processes or resolve problems.
- C5. Everyone's opinions receive attention.
- C6. I have the opportunity to give input to top management about ideas and concerns.
- C12. The organization is truly interested in my ideas and concerns.

ORGANIZATION RESPONSIVENESS $\alpha=.73$

- OC7. People in this organization are strongly committed to doing high quality work.
- OC8. The organization supports activities that address potential problems before they occur.
- OC16. People in this organization are strongly committed to meeting project deadlines.
- OC27. Personnel in this organization are receptive to suggestions, evaluation, and criticism.
- OC28. Personnel in this organization feel responsible for initiating communication about cost, quality and schedule problems on the job.

EFFECTIVENESS OF TOP MANAGEMENT $\alpha=.73$

- OC12. Top management (Level 3) has a good idea of the work that is done in my area.
- OC23. The Center's Corporate Management Team is making decisions that will make our future more secure.

ORGANIZATIONAL COMMUNICATION (ORCOMM) $\alpha=.87$

- C7. Company communication provides motivation and stimulates an enthusiasm for meeting organizational goals.
 - C8. Company's communication makes me feel a vital part of the organization.
-

TABLE 4-3
INTERMEDIATE PROCESS VARIABLES:
CONSTRUCTS, ALPHA COEFFICIENTS, AND SPECIFIC QUESTIONS

TEAM EMPOWERMENT $\alpha=.80$

- TC28. My team has the authority to make decisions that affect our day-to-day work.
- TC29. When my team comes to consensus about how to solve a problem, we have the freedom to implement it.
- TC30. Problem solving is done by going directly to the relevant team rather than through management.
- TC31. I feel comfortable making decisions that affect my team.
- TC34. My team has effectively taken over the responsibilities that used to be held by a manager/supervisor.
- TC36. My team has the competence to make decisions about our work without approval of a supervisor.
- TC40. I have an input into decisions that affect my team.

PROGRESS $\alpha=.76$

- TC17. I am getting results.
- TC18. I am growing and developing professionally on this job.
- TC19. My work is going well.

CHOICE $\alpha=.85$

- TC9. I feel free to select different paths or approaches to my work.
- TC13. I have a sense of freedom in what I'm doing.
- TC15. How I go about things is up to me.
- TC16. I determine what I do on my job.
- TC38. I am exercising a lot of choice in what I am doing.

INTERGROUP COORDINATION/COOPERATION $\alpha=.76$

- OC11. Teams work together to get the job done.
- OC14. In this organization, we all work together as a team.
- OC18. The working environment here encourages one to share information to help other groups.
- OC19. Cooperation with other work groups is valued and rewarded.
- OC20. The NAWC-ADI environment supports communication and cooperation across organizational units.

TEAM COHESIVENESS $\alpha=.86$

- T12. When two or more people in our group have a disagreement, we tend to talk honestly and directly with one another.
 - T14R. There are feelings among team members which tend to pull the group apart.
 - T15. The people I work with help each other when someone falls behind or gets in a tight spot.
 - T20R. My co-workers are afraid to express their real views.
 - T21R. There is constant bickering among my team members.
 - T24. When problems arise, everybody involved works together to solve them.
 - T25. We are ready to defend each other from criticism by people outside our team.
 - T27R. Some of the people I work with have no respect for others.
-

TABLE 4-4
OUTCOME VARIABLES:
CONSTRUCTS, ALPHA COEFFICIENTS, AND SPECIFIC QUESTIONS

JOB SATISFACTION $\alpha=.83$

TC35. I am generally satisfied with the kind of work I do on this job.

TC41. Generally speaking, I am very satisfied with this job.

ORGANIZATIONAL EFFECTIVENESS $\alpha=.76$

OC2. There are less bureaucratic obstacles to overcome since the re-organization.

OC3. The work environment supports people in taking advantage of new opportunities they encounter.

OC4. There is an atmosphere of confidence at NAWC-ADI.

OC5. Since the reorganization problems are solved more directly.

INDIVIDUAL INFLUENCE

AI3. Please indicate your level of confidence that you as an individual can influence the policies and procedures at NAWC-ADI.

TEAM INFLUENCE

AI4. Please indicate your level of confidence that your team/group can influence the policies and procedures at NAWC-ADI.

CUSTOMER SERVICE

AI14. In the past six months, the center's ability to serve customers in a quality manner has..

QUALITY OF WORK

AI17. In the past six months, the quality of products and work produced at NAWC-ADI has...

3. Model to be Investigated

Given the available scaled variables and themes from the interviews combined with the literature review, a model to analyze the survey data was developed incorporating the constructs from the survey. Figure 4-1 is a graphical representation of the model.

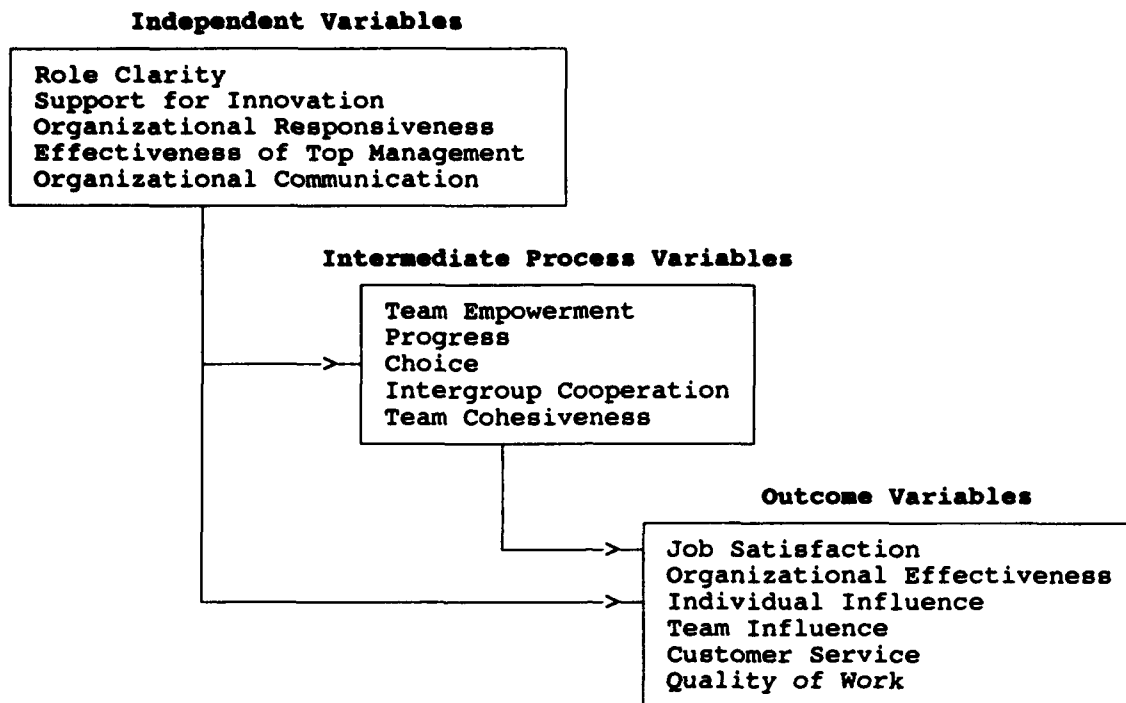


Figure 4-1: Model of Organizational Effectiveness; showing variables and their relationships

4. Model Analysis Method

The relationships between the independent, intermediate process, and outcome variables is the primary focus of the survey analysis. This model presents hypothesized relationships between independent, process, and outcome variables as derived from interviews and existing literature. The first step in the analysis was to determine whether the data support this model using Pearson correlation coefficients to assess the degree of correlation between the variables. After the viability of the model is determined, descriptive statistics are presented to diagnose the status of

NAWC-ADI as perceived by survey respondents. Relevant subgroup differences are also presented. Finally, the employee ratings of availability of specific types of information (see Table 4-5) are correlated with the variables in the central model in order to determine which communication practices are most significantly related to the desired outcomes or effectiveness processes. Descriptive statistics for those with significant correlations are also presented. The results of all these analyses are presented in Chapter V.

TABLE 4-5
INFORMATION AVAILABILITY ITEMS

Respondents were asked to indicate the amount of information they believed they are getting from the types of information listed below using the following response choices.

- 1= None
 - 2= Some, but not enough
 - 3= Enough
 - 4= A bit too much
 - 5= Too much
-

- IA1. Recognition of my efforts.
 - IA2. Employee benefits and pay.
 - IA3. Promotion and advancement opportunities in my organization.
 - IA4. Organization goals.
 - IA5. Company profits and financial standing.
 - IA6. Organizational policies.
 - IA7. Problems facing my organization.
 - IA8. How organization decisions are made that affect my job.
 - IA9. Important new product, service or program developments.
 - IA10. Process improvement ideas from other groups
 - IA11. Specific work schedule requirements to help me set priorities.
 - IA12. Changes in other's work schedules that will affect my work.
 - IA13. Information helping me with technical problems I face in my job.
 - IA14. Information about my job performance
-

V. RESULTS

A. MODEL VERACITY

Table 5-1 presents means, standard deviations, and a correlation matrix for the variables outlined in the quantitative model in Chapter V, Section C3. All correlations are statistically significant ($p < .05$) and all but eight are greater than .25. Three fourths of the correlations are greater than .31, with the highest correlation being .88. (Individual and Team Influence). Squaring these coefficients shows that 10-77 percent of the variance in the variables can explained by one of the other variables in the model for more than three fourths of the variables in the model. These relatively high correlations between the groupings of independent, process, and outcome variables give strong support to the hypothesized model.

TABLE 5-1
DESCRIPTIVE STATISTICS AND CORRELATION MATRIX FOR MODEL VARIABLES

	Mean	s.d.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Role clarity	2.56	.61															
2. Support for innovation	2.50	.52	.38														
3. Organizational responsiveness	2.43	.52	.40	.59													
4. Effectiveness top management	1.98	.75	.36	.56	.52												
5. Organizational communication	2.12	.72	.36	.55	.48	.50											
6. Team empowerment	2.87	.50	.48	.52	.37	.26	.31										
7. Progress	2.61	.56	.63	.42	.46	.55	.42	.55									
8. Choice	2.88	.58	.38	.46	.22	.62	.31	.62	.50								
9. Intergroup cooperation	2.42	.50	.42	.64	.59	.44	.45	.44	.47	.32							
10. Team cohesiveness	2.83	.59	.34	.44	.33	.56	.20	.56	.37	.40	.39						
11. Job satisfaction	2.81	.72	.59	.30	.33	.30	.35	.49	.71	.42	.37	.31					
12. Organization effectiveness	2.06	.59	.30	.55	.47	.48	.50	.43	.49	.32	.52	.28	.33				
13. Individual influence	2.24	1.18	.33	.45	.36	.43	.40	.29	.36	.26	.34	.13	.26	.42			
14. Team influence	2.37	1.14	.29	.49	.39	.46	.42	.31	.35	.26	.39	.19	.26	.44	.88		
15. Customer Service	2.66	.97	.29	.33	.43	.43	.37	.25	.43	.15	.41	.15	.33	.48	.28	.29	
16. Quality of work	2.57	.90	.30	.21	.40	.35	.31	.19	.37	.06	.36	.10	.27	.41	.23	.21	.73

Note: All correlations shown are significant at $p \leq .05$

B. INTERPRETATION OF MODEL CONSTRUCTS

1. Independent Variables

To evaluate the relationship between independent variables and the intermediate process and outcome variables, the most significant correlational results will be described. In addition, the descriptive results and significant subgroup differences will be presented. For all variables discussed in this section, rating scales were 1 (low value) to 4 (high value) unless otherwise noted.

a. Role Clarity

This construct is comprised of four items that ask employees to agree or disagree on a four-point scale with aspects of role clarity at NAWC-ADI. This independent variable is most strongly correlated with the intermediate processes of Progress ($r=.63$) and Team Empowerment ($r=.48$) and the outcome variable Job Satisfaction ($r=.59$). The overall mean of 2.56 is only slightly above the midpoint of 2.50, indicating an even mix of attitudes from respondents regarding the perceived clarity of the authority and responsibility of their jobs (see Table 5-2). Comparison by directorate and level failed to yield any significant differences.

TABLE 5-2
ITEMS AND MEANS FOR ROLE CLARITY CONSTRUCT

ROLE CLARITY $\alpha=.75$, mean=2.56

TC20. I feel certain about how much authority I have. (2.47)

TC21. Clear, planned goals and objectives exist for my job. (2.27)

TC23. I know exactly what is expected of me. (2.49)

TC39. I know my job responsibilities. (3.02)

b. Support for Innovation

This construct is found to have the strongest relationship with the intermediated process of Intergroup Cooperation ($r=.64$). It is also strongly correlated ($r\geq.45$) with three outcome variables; Organizational Effectiveness and both Team and Individual Influence. There are eight items asking employees their opinions regarding organizational support for innovation. Four of the eight items have means above the midpoint (see Table 5-3). The lowest mean rating (2.12) is found for the item "Taking initiative is rewarded at NAWC-ADI." These means (and the overall mean of 2.50) show a fairly neutral opinion of the organizational's support for innovation.

TABLE 5-3
ITEMS AND MEANS FOR SUPPORT FOR INNOVATION CONSTRUCT

INNOVATION $\alpha=.85$, mean=2.50

- OC9. The organization supports personnel in pursuing new opportunities. (2.48)
 - OC10. The organization supports personnel in trying new ways of doing things. (2.59)
 - OC15. Taking initiative is rewarded at NAWC-ADI. (2.12)
 - OC17R. People who offer new ideas are likely to get clobbered. (2.76)
 - OC24. This organization encourages me to share ideas I have about ways to improve processes or resolve problems. (2.64)
 - C5. Everyone's opinions receive attention. (2.41)
 - C6. I have the opportunity to give input to top management about ideas and concerns. (2.52)
 - C12. The organization is truly interested in my ideas and concerns. (2.31)
-

There were no significant differences in this construct between directorates. However, significant differences were discovered between levels. Level one personnel, on the average, rated the organizational support

for innovation significantly ($p < .01$) lower than level two and three (mean=2.39). Level two's mean (2.65) was significantly lower than level three personnel's mean (2.89) for the construct.

c. Organizational Responsiveness

The items for this scale deal with support for quality, proactive problem solving, and openness to suggestions. As with the previous construct of Support for Innovation, the highest correlations are with Intergroup cooperation ($r = .69$) and Organizational Effectiveness ($r = .47$).

There are five items on this scale, with four having means below the midpoint (see Table 5-4). The highest mean (2.74) is found for the item "People in this organization are strongly committed to doing high quality work." The scale mean of 2.43 indicates a slightly negative attitude in regard to the degree of responsiveness or proaction the organization exercises.

TABLE 5-4
ITEMS AND MEANS FOR ORGANIZATION RESPONSIVENESS CONSTRUCT

ORGANIZATION RESPONSIVENESS $\alpha = .73$, mean=2.43

- OC7. People in this organization are strongly committed to doing high quality work. (2.74)
 - OC8. The organization supports activities that address potential problems before they occur. (2.20)
 - OC16. People in this organization are strongly committed to meeting project deadlines. (2.41)
 - OC27. Personnel in this organization are receptive to suggestions, evaluation, and criticism. (2.38)
 - OC28. Personnel in this organization feel responsible for initiating communication about cost, quality and schedule problems on the job. (2.42)
-

The only significant difference found between levels and directorates was between the Project Office (mean=2.29) and the Alpha directorate (mean=2.58). Since the personnel in the Project Office work with the customers directly, it would seem they would be the most sensitive to the customers' perspective and thus more critical about the way commitments are fulfilled, and in the way NAWC-ADI responds to changes in requirements.

d. Effectiveness of Top Management

This construct is comprised of two items that evaluate the employees ratings of confidence they have in upper (L3) management in two different domains; awareness of the work occurring at the operating level and making decisions that will assure the future security of the organization. This variable has correlations greater than .43 for all of the Intermediate Process variables and all of the outcome variables except Job Satisfaction ($r=.30$). The low overall mean (1.98) demonstrates a definite lack of faith that upper management's decisions will assure the future security of the center and a perceived low level of knowledge of competency center area's activities (see Table 5-5).

TABLE 5-5
ITEMS AND MEANS FOR EFFECTIVENESS OF TOP MANAGEMENT CONSTRUCT

EFFECTIVENESS OF TOP MANAGEMENT $\alpha=.73$, mean=1.98	
OC12.	Top management (Level 3) has a good idea of the work that is done in my area. (1.81)
OC23.	The Center's Corporate Management Team is making decisions that will make our future more secure. (2.15)

As one would expect, there was a significant difference between the construct mean for level three personnel (2.53) and the means of levels one and two (1.86 and 1.98, respectively). Obviously this is a problem of self-reporting bias, since the questions were asked specifically about level three personnel. If the level three personnel were excluded from the analysis, it would lower the overall construct mean from 1.98 to 1.91.

e. Organizational Communication

The two questions that make up this construct were designed to evaluate the employee's rating of the motivational value of organizational communication. The highest correlations for this construct are with the Intermediate Process variables of Intergroup Cooperation ($r=.45$) and Progress (.42) and the outcome variable of Organizational Effectiveness ($r=.50$). The low mean (2.12) indicates that, on the average, NAWC-ADI employees do not feel company communication makes them feel "a vital part of the organization," or that "company communication provides motivation and stimulates an enthusiasm for meeting organization goals"(see Table 5-6). There were no significant differences by level or directorate.

TABLE 5-6
ITEMS AND MEANS FOR ORGANIZATIONAL COMMUNICATION CONSTRUCT

ORGANIZATIONAL COMMUNICATION $\alpha=.87$, mean=2.12

- C7. Company communication provides motivation and stimulates an enthusiasm for meeting organizational goals. (2.09)
C8. Company's communication makes me feel a vital part of the organization. (2.15)
-

2. Intermediate Process Variables

a. Team Empowerment

This construct has seven questions designed to assess an employee's opinion of the extent to which individual teams in the organization are given the authority they need to accomplish their tasks. The variable has the highest correlations with the outcomes of Job Satisfaction ($r=.49$) and Organizational Effectiveness ($r=.43$). All the individual question means were above the midpoint, and ranged from 2.52 to 3.05 on a four-point scale (see Table 5-7). This indicates that, in general, NAWC-ADI employees feel the organization has empowered the teams to make their own decisions and conduct the team business without interference from top management. These results demonstrate the successful achievement of one of the goals of the reorganization. However, there is still room for improvement in these areas.

Level one personnel rated this construct (mean=2.85) significantly lower than levels two and three (means=2.96 and 3.07, respectively). This is noteworthy because the personnel who make up most of the teams are level

one personnel, and they gave the lowest Team Empowerment rating.

TABLE 5-7
ITEMS AND MEANS FOR TEAM EMPOWERMENT CONSTRUCT

TEAM EMPOWERMENT $\alpha=.80$, mean=2.87

- TC28. My team has the authority to make decisions that affect our day-to-day work. (2.98)
TC29. When my team comes to consensus about how to solve a problem, we have the freedom to implement it. (2.76)
TC30. Problem solving is done by going directly to the relevant team rather than through management. (2.65)
TC31. I feel comfortable making decisions that affect my team. (3.02)
TC34. My team has effectively taken over the responsibilities that used to be held by a manager/supervisor. (2.51)
TC36. My team has the competence to make decisions about our work without approval of a supervisor. (3.04)
TC40. I have an input into decisions that affect my team. (3.05)
-

There were also significant differences by directorate. Beta and Command Staff personnel scored the lowest (means=2.84 and 2.79). Beta personnel normally provide manufacturing support for many projects concurrently and therefore may not be perceiving their work as a project team experience. The Command Staff personnel, for the most part, retained their old job responsibilities from before the reorganization, with the addition of the security force. Most are not directly associated with specific project teams so may not be benefiting equally from the team empowerment environment.

b. Progress

This construct assesses an individual's sense of progress in their work. The highest correlation is with the

outcome of Job Satisfaction ($r=.71$). The three items comprising the construct of Progress have means greater than the midpoint rating of 2.50, indicating, overall, a positive feeling about the amount of progress or accomplishment the employees at NAWC-ADI are making on the job (see Table 5-8).

TABLE 5-8
ITEMS AND MEANS FOR PROGRESS CONSTRUCT

PROGRESS $\alpha=.76$, mean=2.79

TC17.I am getting results. (2.93)

TC18.I am growing and developing professionally on this job. (2.64)

TC19.My work is going well. (2.81)

There were significant differences in this construct by directorate. The low score was in Beta (mean=2.50), which was significantly lower than all the other directorates. However, this is on the midpoint, so we can assume the personnel in Beta are fairly evenly split between those who feel a sense of progress in their work and those who don't. In contrast, the majority of personnel from other directorates expressed a sense of progress.

c. Choice

This construct consists of five items. Together with the construct of Progress discussed above, these variables comprise two aspects of individual empowerment as characterized by Thomas and Velthouse (1990). As with the Progress variable, Choice is most strongly correlated with the Job Satisfaction outcome variable ($r=.42$). All five items have means greater than the midpoint, indicating an overall

feeling of independence in employees' job-related duties (see Table 5-9). The significant differences in this construct are similar to those already mentioned in the innovation construct; level one's mean score (2.85) being significantly lower than two's (mean=2.99), which is also significantly lower than level three's (mean=3.17). It could be that as organizational level increases, so does the choice in job responsibilities. It could also be that the degree of task interdependence at the operational levels limits the amount of individual choice. A third possibility is that there are organizational constraints that need to be identified that limit the near- and mid-horizon levels from greater degrees of choice.

TABLE 5-9
ITEMS AND MEANS FOR CHOICE CONSTRUCT

CHOICE α =.85, mean=2.88

TC9. I feel free to select different paths or approaches to my work. (2.95)
 TC13. I have a sense of freedom in what I'm doing. (2.95)
 TC15. How I go about things is up to me. (2.86)
 TC16. I determine what I do on my job. (2.71)
 TC38. I am exercising a lot of choice in what I am doing. (2.93)

d. Intergroup Cooperation

Intergroup Cooperation has the strongest correlation with the outcome variable Organizational Effectiveness ($r=.52$). Of the five items making up this construct, four of the means are below the midpoint (see Table 5-10). This signals a belief by employees that, although project teams have been established, there needs to be more

coordination and cooperation between teams. No significant differences were found by directorate or level.

TABLE 5-10
ITEMS AND MEANS FOR INTERGROUP COOPERATION CONSTRUCT

COORDINATION AND COOPERATION $\alpha=.76$, mean=2.42

- OC11.Teams work together to get the job done. (2.62)
OC14.In this organization, we all work together as a team. (2.22)
OC18.The working environment here encourages one to share information to help other groups. (2.48)
OC19.Cooperation with other work groups is valued and rewarded. (2.37)
OC20.The NAWC-ADI environment supports communication and cooperation across organizational units. (2.39)
-

e. Team Cohesiveness

This final variable in the Intermediate Process group has statistically significant correlations with the outcome variables, of which the strongest are with Job Satisfaction (.31) and Organizational Effectiveness (.28). This construct is comprised of eight items designed to evaluate the degree to which employees feel that team cohesiveness is present in the organization. All of the questions have mean scores above the midpoint, with an overall mean score of 2.83 (see Table 5-11). This demonstrates that, on the average, the employees as NAWC-ADI feel positively about the amount of team cohesiveness present in the teams to which they are assigned.

The significant differences between directorates followed a familiar pattern. Beta and the Command Staff had the lowest mean score (2.68 and 2.73, respectively). This could be due to the factors previously mentioned about the lack of project focused team involvement.

TABLE 5-11
ITEMS AND MEANS FOR TEAM COHESIVENESS CONSTRUCT

TEAM COHESIVENESS $\alpha=.86$, mean=2.83

- T12. When two or more people in our group have a disagreement, we tend to talk honestly and directly with one another. (2.82)
 T14R. There are feelings among team members which tend to pull the group apart. (2.54)
 T15. The people I work with help each other when someone falls behind or gets in a tight spot. (3.00)
 T20R. My co-workers are afraid to express their real views. (2.84)
 T21R. There is constant bickering among my team members. (3.07)
 T24. When problems arise, everybody involved works together to solve them. (2.82)
 T25. We are ready to defend each other from criticism by people outside our team. (2.84)
 T27R. Some of the people I work with have no respect for others. (2.75)

3. Outcome Variables

a. Job Satisfaction

This construct is made up of two questions, both asking employees directly whether or not they agree with statements of job satisfaction. The overall mean on this construct (2.81) shows a fairly positive amount of job satisfaction present in the organization (see Table 5-12). There were also no significant differences by level and directorate.

TABLE 5-12
ITEMS AND MEANS FOR JOB SATISFACTION CONSTRUCT

JOB SATISFACTION $\alpha=.83$, mean=2.81

- TC35. I am generally satisfied with the kind of work I do on this job. (2.89)
 TC41. Generally speaking, I am very satisfied with this job. (2.72)

b. Organizational Effectiveness

The four questions comprising this construct give an overall impression of NAWC-ADI in the areas of bureaucratic

obstacles, problem solving, and work environment. The overall mean of 2.06 demonstrates a general dissatisfaction in the way the organization supports problem solving and innovative ideas. The lowest mean (1.64) was on the item "there is an atmosphere of confidence at NAWC-ADI" (see Table 5-13). While part of the problem could stem from the current DoD environment of hiring freezes and base closures, the other items are organization specific, so need to be addressed by NAWC-ADI.

TABLE 5-13
ITEMS AND MEANS FOR ORGANIZATIONAL EFFECTIVENESS CONSTRUCT

ORGANIZATIONAL EFFECTIVENESS $\alpha=.76$, mean=2.06

- OC2. There are less bureaucratic obstacles to overcome since the re-organization. (2.12)
 - OC3. The work environment supports people in taking advantage of new opportunities they encounter. (2.33)
 - OC4. There is an atmosphere of confidence at NAWC-ADI. (1.64)
 - OC5. Since the reorganization problems are solved more directly. (2.07)
-

The familiar pattern of significant differences between levels again emerges in this construct, with level one in the basement with a mean score of 1.96 (meaning basically they disagreed with all the construct statements). Levels two and three (means=2.12 and 2.34, respectively) also were not positive about these effectiveness characteristics.

c. Individual Influence

This is a single-item construct, asking employees to rate their confidence in their own influence in the organization on a five-point scale (1=low; 5=high). The overall mean of 2.24 demonstrates a low level of confidence in

their ability to influence policies and procedures at NAWC-ADI.

There were significant differences between all levels. Levels one, two, and three scored in the same order as in the previous constructs (means=2.06, 2.40, and 3.23 respectively). This is perhaps typical of an organization who designates personnel in the organization according to levels.

d. Team Influence

This single-item construct was designed to measure employees levels of confidence in their team's ability to influence policies and procedures at NAWC-ADI. This variable uses the same 5-point scale as above and has a high correlation with the previous construct-- Individual Influence ($r=.88$). From the low overall mean (2.37) compared to the midpoint (3.0) it is apparent that respondents feel little confidence in their team's influential abilities.

Again the only significant differences were by level, in the same pattern as the Individual influence item (means=2.15, 2.54, and 3.4). This result may be of more organizational concern given that NAWC-ADI has reorganized around a team-based concept of operations.

e. Customer Service

The third single-item construct to be analyzed is Customer Service. This question was designed to assess the respondent's feeling of the change in NAWC-ADI's ability to

serve customers in the past six months. The overall mean of 2.66 on a five-point Likert scale (1=greatly decreased; 5=greatly increased with a "3" meaning no change) demonstrates that, on the average, the respondents feel there has been a slight decrease in customer service recently.

There were significant differences by directorate for this item. The mean score for the respondents from Gamma (2.28) was significantly lower than those from all other directorates (Alpha=2.87, Beta=2.52, Command Staff=2.82, and Project Office=2.66).

f. Quality of Work

Finally, this item was included to measure individual's feelings toward the overall quality of products and work produced at NAWC-ADI. The 5-point rating scale was the same as described above. The highest correlation for this item was with the Customer Service variable (.73). The overall mean (2.57) shows that the employees believe the quality of work is decreasing slightly.

There were significant differences by level and directorate for this item. Level two respondent's mean (2.38) was significantly lower than level one's mean score (2.66). Gamma personnel had the lowest mean score (2.20), which was significantly lower than the mean scores for Alpha and Command Staff respondents (2.71 and 2.72, respectively).

C. RELATION OF COMMUNICATION VARIABLES TO MODEL CONSTRUCTS

Because one of the main objectives of this thesis is to conduct an empirical study to evaluate how specific aspects of organizational communication are related to the varying aspects of organizational effectiveness, the next logical step was to determine which specific Information Availability items have the strongest relationships with the organizational effectiveness model. This is of particular concern to NAWC-ADI because the restructuring from functional vertical structure to team-based matrix structure eliminated traditional vertical channels of communication.

The items, means, and standard deviations from the Information Availability section of the questionnaire are listed in Table 5-14. The correlations between these items and the organizational effectiveness model constructs are shown in Table 5-15.

Because the Information Availability (IA) items are single items and thus more limited in reliability than scaled constructs, a lower correlation coefficient decision rule was decided upon; that of any correlation greater than or equal to .25 was considered to be worth comment. This means that any of the IA items satisfying this constraint would explain at least 6.25 percent of the variance in the model constructs.

TABLE 5-14
INFORMATION AVAILABILITY ITEMS: MEANS AND STANDARD DEVIATIONS

	MEAN	S.D.
IA1. Recognition of my efforts.	2.19	.73
IA2. Employee benefits and pay.	2.53	.68
IA3. Promotion and advancement opportunities in my organization.	1.73	.79
IA4. Organization goals.	2.44	.83
IA5. Company profits and financial standing.	2.44	.92
IA6. Organizational policies.	2.53	.84
IA7. Problems facing my organization.	2.50	.84
IA8. How organization decisions are made that affect my job.	2.02	.81
IA9. Important new product, service or program developments.	2.22	.73
IA10. Process improvement ideas from other groups.	2.29	.83
IA11. Specific work schedule requirements to help me set priorities.	2.43	.78
IA12. Changes in other's work schedules that will affect my work.	2.32	.80
IA13. Information helping me with technical problems I face in my job.	2.39	.69
IA14. Information about my job performance.	2.16	.72

Items IA2, IA5, IA6 and IA7 were immediately removed from consideration because they didn't correlate highly with any of the model constructs. Items IA9, IA10, and IA12 were significantly correlated with several of the independent variables, including Support for Innovation, Effectiveness of Top Management, and Organizational Communication, but did not reach the criterion level for outcome variables. This means that the amount of information received in the areas of new developments, process improvement ideas, and changes in other's work schedules has a significant impact on employee's perceptions of organizational support for innovation and organizational communication as a source of motivation, and the effectiveness of top management.

TABLE 5-15
CORRELATION MATRIX FOR MODEL VARIABLES BY COMMUNICATION VARIABLES

	IA1	IA2	IA3	IA4	IA5	IA6	IA7	IA8	IA9	IA10	IA11	IA12	IA13	IA14
1. Role clarity	.23	.00*	.17	.19	.03*	.19	.16	.22	.13	.13	.33	.19	.16	.33
2. Support for innovation	.46	.20	.39	.28	.24	.20	.20	.31	.32	.28	.34	.29	.36	.39
3. Organizational responsiveness	.29	.08*	.25	.28	.13*	.18	.13	.26	.22	.21	.29	.23	.26	.30
4. Effectiveness top management	.24	.09*	.20	.22	.14	.17	.17	.35	.25	.14	.25	.23	.25	.28
5. Organizational communication	.34	.08*	.26	.26	.14	.18	.15	.33	.23	.21	.28	.25	.28	.35
6. Team empowerment	.19	.01*	.22	.16	.11*	.15	.06*	.09*	.14	.15	.30	.24	.22	.19
7. Progress	.19	.00*	.18	.20	.08*	.16	.04*	.19	.12*	.16	.28	.14	.23	.22
8. Choice	.25	.04*	.16	.07*	.12*	.08*	.03*	.15	.09*	.13	.20	.11*	.16	.16
9. Intergroup cooperation	.26	.06*	.28	.27	.16	.23	.15	.29	.24	.24	.35	.26	.28	.30
10. Team cohesiveness	.26	.13	.22	.18	.12*	.11*	.05*	.09*	.13	.15	.27	.21	.22	.18
11. Job satisfaction	.16	.00*	.13	.14	.01*	.10*	.00*	.11*	.09*	.09*	.26	.12*	.11*	.17
12. Organization effectiveness	.28	.09*	.29	.16	.11*	.10*	.05*	.26	.16	.12	.27	.24	.28	.23
13. Individual influence	.19	.00*	.21	.09*	.10*	.11*	.18	.29	.06*	.09*	.16	.18	.21	.20
14. Team influence	.24	.00*	.23	.12*	.16	.14	.17	.30	.10*	.10*	.17	.24	.26	.21
15. Customer Service	.13	.02*	.17	.18	.04*	.11*	.05*	.20	.11*	.08*	.19	.14	.15	.15
16. Quality of Work	.08*	.0	.09*	.18	0	.13	.0	.15	.08*	.10*	.17	.14	.08*	.15

* - Correlations with $p > .01$, the remaining correlations are significant at $p < .01$

The remaining seven items all correlate highly with more than four of the model constructs. The results for each item will be described separately.

1. IA1: Recognition of my efforts.

This item correlated strongly with seven of the 14 model constructs, as provided in Table 5-16.

TABLE 5-16
CORRELATION COEFFICIENTS FOR IA1 BY MODEL CONSTRUCTS

INDEPENDENT VARIABLES	r
Support for innovation	.46
Organizational responsiveness	.29
Organizational communication	.34
 PROCESS VARIABLES	
Choice	.25
Intergroup Cooperation	.26
Team cohesiveness	.26
 OUTCOME VARIABLES	
Organizational effectiveness	.28

This is not a surprising result, since receiving recognition on the job has always been one of the few things all employees desire. The overall mean of 2.19 indicates that, on the average, NAWC-ADI employees feel they are receiving some, but not enough information in the area of recognition of their efforts. There are also significant differences between levels on this particular question. Level one personnel scored lower (mean=2.04) than levels two and three (means=2.39 and 2.31, respectively).

2. IA3: Promotion and advancement opportunities...

This question was highly correlated with five of the model constructs, as listed in Table 5-17. Because most of

TABLE 5-17
CORRELATION COEFFICIENTS FOR IA3 BY MODEL CONSTRUCTS

INDEPENDENT VARIABLES	r
Support for innovation	.39
Organizational responsiveness	.25
Organizational communication	.26
PROCESS VARIABLES	
Intergroup Cooperation	.28
OUTCOME VARIABLES	
Organizational effectiveness	.29

the constructs involved (all except Intergroup cooperation) are organizational level constructs, it follows if top management makes information in this area readily available, it will enhance the organization in the employees' eyes. The overall mean of 1.73, however, indicates that the organization has a ways to go in this area. There are also significant differences by level, with level one personnel on the low end of the information scale again (mean=1.68). In fact, 52 percent of level one and 45 percent of level two respondents answered this item with a 1; meaning they receive no information concerning promotion and advancement opportunities. This would seem to be a major informational deficit.

3. IA4: Organizational goals.

The four constructs listed in Table 5-18 correlated highly with this item. The correlations suggest that

TABLE 5-18
CORRELATION COEFFICIENTS FOR IA4 BY MODEL CONSTRUCTS

INDEPENDENT VARIABLES	r
Support for innovation	.28
Organizational responsiveness	.28
Organizational communication	.26
PROCESS VARIABLES	
Intergroup Cooperation	.27

increases in information about organizational goals will lead to an increased sense of motivation derived from organizational communication and an increase in the organization's pursuit of quality, timeliness, innovation and proaction. In addition, at the Intermediate Process level, increased information about organizational goals enables increased intergroup cooperation. The overall mean of 2.44 indicates that NAWC-ADI is doing a fairly good job of providing employees with information on organizational goals. There were no significant differences by level or directorate.

4. IA8: How organization decisions are made...

Since IA8 correlates strongly with four of the five independent variables and three of the four outcome variables, (see Table 5-19) this is obviously a crucial area of information flow. This item is a key to the decision making processes at NAWC-ADI, and is important to all levels of

employees, particularly level one. The need to understand the motivation behind sometimes inexplicable decisions made by upper management is common to the lower levels of an organization. The overall mean of 2.02 demonstrates the organization provides, on the average, some but not enough information in the area of how organization decisions are made that affect employees jobs. There were significant differences by level; level one and two's means (1.94 and 2.06, respectively) were lower than level three's mean (2.45).

TABLE 5-19
CORRELATION COEFFICIENTS FOR IA8 BY MODEL CONSTRUCTS

INDEPENDENT VARIABLES	r
Support for innovation	.31
Organizational responsiveness	.26
Effectiveness of top management	.35
Organizational communication	.33
PROCESS VARIABLES	
Intergroup Cooperation	.29
OUTCOME VARIABLES	
Organizational effectiveness	.26
Individual influence	.29
Team influence	.30

5. IA11: Specific work schedule requirements...

According to the correlations, this is the most important of the elements of information availability. Highly correlated with 11 of 16 model constructs, (Table 5-20) this item provides a look into the general feeling at NAWC-ADI with respect to scheduling work and developing a priority system to aid them in this task. From the overall mean on this item (2.43) it is apparent that the respondents feel that they are receiving a sufficient amount of information concerning work

schedule requirements. No significant differences were found by level or directorate.

TABLE 5-20
CORRELATION COEFFICIENTS FOR IA11 BY MODEL CONSTRUCTS

INDEPENDENT VARIABLES	r
Role clarity	.33
Support for innovation	.34
Organizational responsiveness	.29
Effectiveness of top management	.25
Organizational communication	.28
PROCESS VARIABLES	
Team empowerment	.30
Progress	.28
Intergroup Cooperation	.35
Team cohesiveness	.27
OUTCOME VARIABLES	
Job satisfaction	.26
Organizational effectiveness	.27

6. IA13: ... helping me with technical problems...

This question was highly correlated with seven of the 14 constructs used in the model (see Table 5-21). This is to be expected because of the technical nature of most of the work at NAWC-ADI, and is reflected in the particular

TABLE 5-21
CORRELATION COEFFICIENTS FOR IA13 BY MODEL CONSTRUCTS

INDEPENDENT VARIABLES	r
Support for innovation	.36
Organizational responsiveness	.26
Effectiveness of top management	.25
Organizational communication	.28
PROCESS VARIABLES	
Intergroup Cooperation	.28
OUTCOME VARIABLES	
Organizational effectiveness	.28
Team Influence	.26

constructs listed. All of the constructs this item correlates strongly with are organization or team based, which lends credence to the new project team approach initiated by the reorganization. NAWC-ADI is doing fairly well in this area of information also, as evidenced by the overall mean of 2.39. There were no significant differences by level or directorate.

7. IA14: Information about my job performance.

This item was highly correlated with the six constructs listed in Table 5-22. The overall mean is 2.16, indicating that, on the average, the respondents feel they are

TABLE 5-22
CORRELATION COEFFICIENTS FOR IA14 BY MODEL CONSTRUCTS

INDEPENDENT VARIABLES	r
Role Clarity	.33
Support for innovation	.39
Organizational responsiveness	.30
Effectiveness of top management	.28
Organizational communication	.35
PROCESS VARIABLES	
Intergroup Cooperation	.30

receiving some, but not enough information of this type. Level one respondents scored significantly lower than level two respondents, following the familiar pattern demonstrated in the previous questions and model constructs.

D. RESULTS SUMMARY

All model variables were strongly intercorrelated, therefore proving the viability of the model. Respondents scored high in the areas of team and individual empowerment,

job satisfaction and team cohesiveness. Lower ratings were found for organizational responsiveness, motivational communication, effectiveness of top management, intergroup cooperation, organizational effectiveness, team and individual influence, customer service, and quality of work. Level one personnel scored significantly lower than level two and three employees in six of the 16 constructs; Support for Innovation, Team Empowerment, Choice, Organizational Effectiveness, Individual Influence, and Team Influence. Beta directorate employees scored significantly lower than the other directorates in three of the five intermediate process variables; Team Empowerment, Progress, and Team Cohesiveness. Information availability was highest in the area of specific scheduling requirements and lowest in career and advancement paths. A more detailed summary is found in the next chapter.

VI. CONCLUSIONS AND RECOMMENDATIONS

This analysis of NAWC-ADI's ratings on various scales of organizational effectiveness and their correlations with specific areas of information availability provides an interesting look at the effects of reorganization and installation of a matrix-type project team environment. These findings are discussed below, followed by the implications they hold for NAWC-ADI and recommendations for further research.

A. SUMMARY OF FINDINGS

1. Model Variables

Relationships between independent and outcome variables in the organizational effectiveness model all show strong positive correlations. This suggests that increased emphasis by NAWC-ADI in the areas of role clarity, organizational support for innovation, proactive behavior, and communication will lead to higher levels in outcomes such as job satisfaction, feelings of influence, and customer service. The strong positive correlations between the intermediate process and outcome variables demonstrates that developing individual and team empowerment, team cohesiveness, along with intergroup cooperation, is also a key step in increasing the desired organizational outcomes.

The strongest correlations among the model variables were in the areas of team cohesiveness, empowerment, and job satisfaction. The research by Keller (1986) and O'Keefe, Kernaghan, and Rubenstein (1975) indicate team cohesiveness, job satisfaction, and an innovative orientation are predictors of project team performance. This seems to be borne out by the significant correlations between team cohesiveness and job satisfaction. The mean ratings on these variables suggest NAWC-ADI is achieving more perceived success in team cohesiveness than in perceived support for innovation.

Thomas and Velthouse's (1990) work on intrinsic motivation is certainly supported by the high correlations between the empowerment (both team and individual) and job satisfaction constructs. The importance of team development (Davis, 1977; Keller, 1986) cannot be overemphasized. Without group cohesiveness, project teams and customer service teams cannot be fully effective. The positive score on job satisfaction was certainly influenced strongly by these variables. The mean ratings for these variables are also among those with the highest mean ratings. This is a likely result of both the efforts at NAWC-ADI in the areas of team development and self-management and the fact that project teams existed to some extent before the reorganization. Teams are recognized as being crucial to the customer focus of the new organization.

These results have practical implications in terms of training. NAWC-ADI needs to move away from the concept of individual training (i.e., 40 hours for each person) and concentrate on team skill development. The evidence can be found in the results; in the empowerment and cohesiveness variables, Beta and Command Staff consistently ranked significantly lower than the rest of the organization. As alluded to in the results section, this would appear to be because the matrix structure (as implemented at NAWC-ADI) does not fully integrate these two directorates into a project team focus. With more emphasis on team-based skills, perhaps this trend could be reversed. Because these variables are so highly correlated with job satisfaction, effort in this area would surely be rewarded quickly. Job satisfaction has been linked to performance in project teams (Keller, 1986) so the organization should benefit as a whole.

A related issue is the appropriateness of individual performance feedback. Satisfaction with the amount of information in this area is low according to the results. This would suggest that the performance appraisal system must become more oriented to team functions and measurement of long-term project/organization goals. Current practice provides each employee with a job description and an individual performance appraisal review. This does not reinforce the culture and values of the team concept. It is mainly a result of the requirements of the civil service

system which provides iron-clad rules and regulations to follow concerning performance appraisals, promotions, and grievances. Extensive changes government-wide need to take place to remedy this weakness in a team-based matrix organization.

There are some concerns with the remaining variables on which the mean scores were below the midpoint (all of the independent variables and five of the six outcome variables). These independent and outcome variables are all organization-level constructs. This would seem to indicate that, as an organization, NAWC-ADI has some improvements to make in the way upper management deals with the project teams.

There is currently a lack of congruence between the goals of restructuring as outlined by the leverage process and the perceived organizational policies and support for processes that will contribute to achieving these. This is illustrated by the results on the organizational responsiveness and organizational effectiveness constructs, specifically the items "The organization supports activities that address potential problems before they occur" (mean=2.20) and "Since the reorganization, problems are solved more directly" (mean= 2.07). This provides support for the research by Bartlett and Ghoshal (1992) and Koch (1979) stating that the organizations must concern themselves with more than just the structure of the organization. Accepting the new structure in all facets of the organization and in the

minds of the managers is a key step towards organizational effectiveness, one which NAWC-ADI employees feel has not been taken yet.

Davis and Lawrence (1977) also state that an advantage of a matrix structure is in its flexibility. The fairly high ratings on the Choice variable indicates some success in this area. However, more significant is the lower rating on organizational support for innovation. If a goal of a matrix structure is flexibility, then there seems to be a lack of system congruence in employees perception of the support for innovation at NAWC-ADI. The low mean (2.12) on the item "Taking initiative is rewarded at NAWC-ADI" indicates that most employees disagree that there is any positive reinforcement for innovative behavior.

NAWC-ADI also appears to be struggling with increased levels of conflict between groups due to the installation of a matrix structure (Davis and Lawrence, 1977). Four of the five item means from the group of questions dealing with intergroup cooperation were below the midpoint, indicating that the conflict is taking place, and the teams are apparently not cooperating well to solve the problem.

NAWC-ADI needs to concentrate on the continuing implementation of matrix ideals at all levels. Training of managers in "team building" concepts and issues is vital to reinforce the matrix concept. While team cohesion ratings are positive, this will continue to be an area needing attention

along with interteam collaboration and conflict resolution if the matrix structure is to succeed.

The low mean score in the effectiveness of top management variable shows that employees feel the level three managers need to become more aware of what is happening at the operational level. This doesn't mean they must be more involved; only that the individuals in the project teams should be aware that level three managers have a good idea of what the project teams are working on, and the concerns the teams have about their futures.

Some of this feeling of concern is evidenced in the low scores on the influence constructs, particularly with level one personnel. Since level one personnel are the heart of the teams in the organization, this will continue to be a problem until such time as they feel more secure in their opportunities to influence the policy and procedures at NAWC-ADI.

Particularly disturbing is that, on the average, the organization believes the quality of their work and their ability to serve the customer has decreased in the past six months. This is most pronounced in the Gamma directorate. Because Gamma deals with the fleet directly and is responsible for product assurance, they would have a first-hand account of the reports from their customers. The typical effect a restructuring has on an organization is an initial dip in customer service and productivity, followed by a gradual rise

to new, higher levels of efficiency, productivity and responsiveness to customers' wishes (Bridges, 1990). A significant goal of this research is to provide NAWC-ADI with information to assist them in successfully managing this transition period by identifying areas where successful change is leading and areas where it is lagging.

The external environment is an overriding concern to employees at NAWC-ADI also. The biggest portion of this is the downsizing facing the entire Department of Defense. With the government-wide hiring freeze, budget reductions, and base closings occurring, these employees are not certain that they will still be employed at NAWC-ADI, or in fact if the center will exist at all in the future. The possibility of a reduction-in-force (RIF) looms on the horizon, despite upper management's firm denial of any intentions toward this tact. These concerns are reflected in the employees' rating of a question regarding their confidence in upper management's ability to make decisions that will keep the future of the Center secure. The reorganization demonstrated the willingness of upper management to change to fit the times, but with the Base Realignment and Closure Commission (BRAC) meeting to consider actions for fiscal year 1995, the tension remains. This is possibly best demonstrated by the overall mean on the item "There is an atmosphere of confidence at NAWC-ADI" (mean of 1.64, the lowest overall mean of any question on the survey).

Given some of the results indicating NAWC-ADI's continuing struggle to achieve outcomes, particularly with indications of low morale, the organization needs to resist the urge to revert to a bureaucratic functional structure (Mintzberg, 1983). This is particularly true given the likelihood that some of the indicators such as morale and perceived individual and team influence are being significantly impacted by external environmental events (i.e., BRAC and RIFs) and may not be attributable solely to the restructuring.

2. Information Availability

Davis and Lawrence (1977) also indicate that a matrix organization requires "the human processing of a great deal of information." Results show NAWC-ADI is successfully achieving satisfactory information availability in the following areas:

- Employee benefits and pay
- Organization goals
- Company profits and financial standing
- Organizational policies
- Problems facing the organization
- Specific work schedule requirements

The organization is having more difficulty meeting information availability needs in the following areas:

- Recognition of employee efforts
- Promotion and advancement opportunities

- How organization decisions are made
- Important new product, service or program developments
- Process improvement ideas from other groups
- Changes in other's work schedules
- Information helping with technical problems
- Information about job performance.

The aspect of information availability most correlated to the organizational effectiveness constructs was in the area of "specific work schedule requirements." This demonstrates the importance employees attach to accomplishing their work in a timely fashion, and the concern they feel over ambiguous or conflicting scheduling requirements. The overall mean for this item (2.43) shows that the organization is doing fairly well in this area, which is promising for NAWC-ADI.

Items in the general areas of personal feedback and organizational decision making correlated strongly with roughly half of the model constructs. This is congruent with the literature which agrees that providing employees with recognition of their efforts and including them in the decision making processes is a key to the success of any team-based organization. The overall means in these areas (2.19, 2.16, 2.02) indicate employees are receiving some, but not enough information concerning personal performance and organizational decision making processes. The undercurrent here confirms what was stated earlier about employees' concern over appraisal systems, particularly in a project team

environment where the team is the central focus, and individual contributions are difficult to sort out. It also concerns the discussion above concerning the limited perception of both team and individual influence in organizational decisions. The first step to having influence in decision making is having information about these processes.

The questions concerning promotion and advancement opportunities and organizational goals correlated with about one-third of the variables in the organizational effectiveness model. The item "promotion and advancement opportunities" has an overall mean of 1.73, the lowest of the information availability items. This mirrors the recurring theme of employees having a difficult time determining a career path in this new matrix organization (Houglan, 1993). Because level one employees see themselves as lower in the company than level two employees, they consider level two positions as goals for advancement. However, at NAWC-ADI, level two personnel are not uniformly senior in the civil service General Service (GS) scale. Obviously there is not congruence between the organizations career path and the civil service system. Herzberg's motivation factors include individual growth and recognition as significant inputs to overall job satisfaction. Without a clear path for advancement, this will weigh heavily on employees' ratings of job satisfaction.

Information on organizational goals is also a key item. In this era of budget cutbacks and hiring freezes, knowing that the top management folks have a plan in mind is very important to an individual's state of mind. The overall mean of 2.44 suggests NAWC-ADI is doing well in this area, due to substantial efforts of senior management to develop and publish their visions for the organization.

B. RECOMMENDATIONS FOR FURTHER RESEARCH

NAWC-ADI provides an interesting organization for further research. The change process itself requires further study, before the corporate knowledge is lost. A case study on the reorganization would contribute to an understanding of the dynamics of change in a large organization in general and in a public sector organization in particular. Topics such as who led the change, what was the felt need, and how was the process initially carried out would contribute to the understanding of organizational change and resistance to change. It would also provide some important lessons learned that could inform the change being planned by the entire Aircraft Division of NAWC.

The data provided by the survey is only analyzed in the "big picture" sense in this thesis. A more focused examination of the variables that have the strongest impact on project team effectiveness could be conducted. The team-level effectiveness data were not available at the time of this report. However, as these become available, the predictive

relationship between the organizational effectiveness model variables and ratings of team performance can be examined.

Many of the questions used in this survey were also used in previous research at NAWC-ADI. A "before and after" study could be conducted, examining the specific effects of the reorganization itself. In addition, the constructs of customer service and product quality can be applied again in the future to obtain a better idea of the effects of the reorganization in these areas over time.

Research on specific processes would contribute to a better understanding of the interaction between organizational components in a public sector organization. An understanding of the effect of unit costing and Defense Business Operations Funds (DBOF) would provide insight into the issues of direct and indirect funding at NAWC-ADI and military organizations. This would aid in determining whether or not the DBOF system is a driving force or a hinderance in an organization trying to adjust to the new defense environment.

A study of the production management aspects at NAWC-ADI would facilitate a more comprehensive picture of process problems. Production management is the life blood of NAWC-ADI. If the end product is the purpose, then the production process is the **how** of an organization. The types of scheduling techniques, manufacturing software, inventory models and quality assurance procedures used at NAWC-ADI would

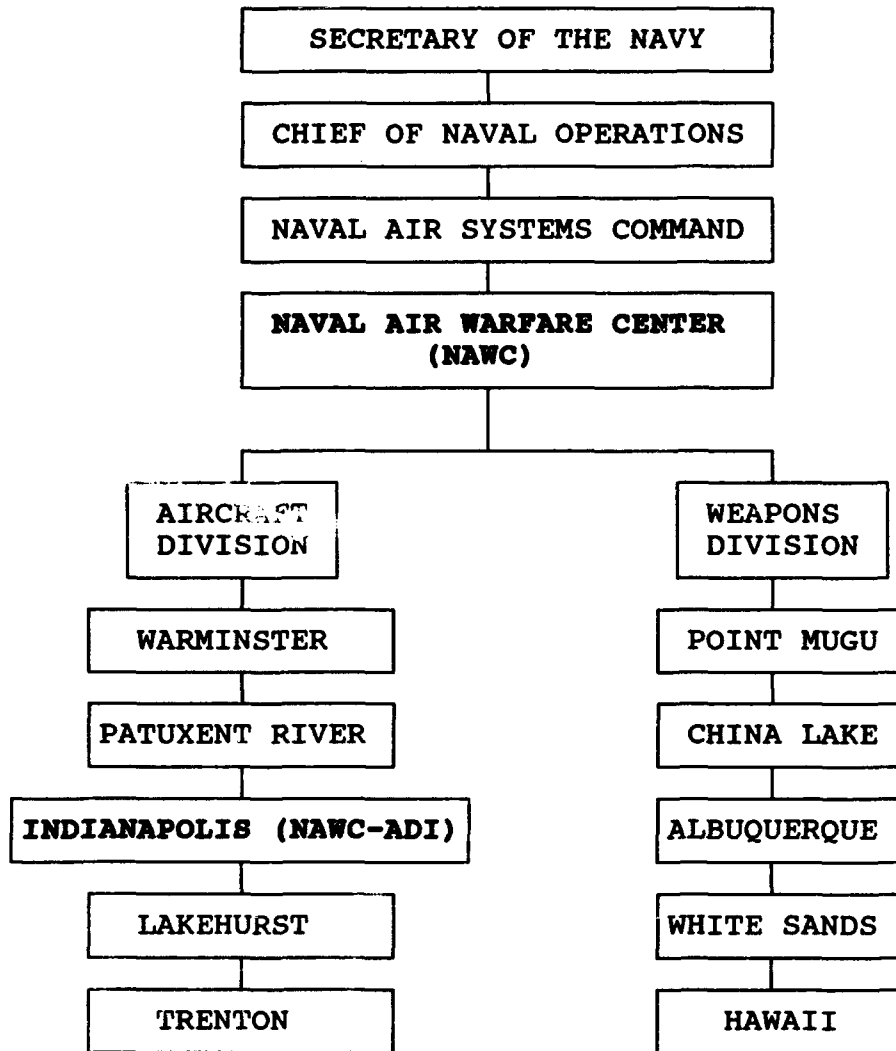
help to determine if the organizational innovations have been superficial or have permeated the entire organization.

Additional research is needed on the personnel issues in a public sector organization that is no longer conducting itself in a traditional bureaucratic manner. How does a personnel system imposed on an innovative organization affect the change process? Is it treated as an external factor or as an internal constraint? Can career ladder positions and lengthy grievance procedures coexist in a dynamic organization that is adjusting to customer demand?

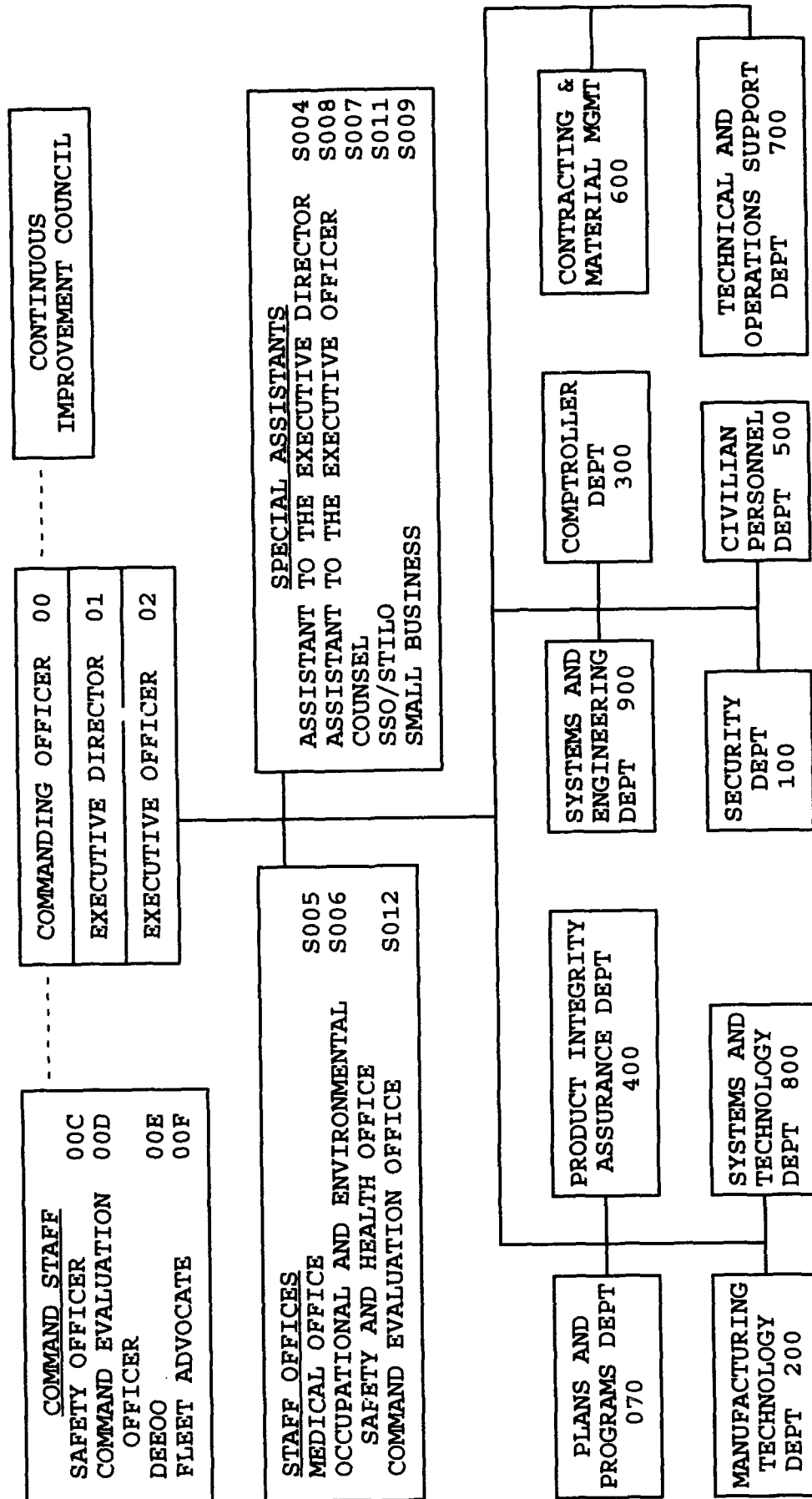
Additional research is needed throughout the public sector (especially in the Department of Defense) to identify those organizations that have attempted large-scale change. The question for NAWC-ADI and the entire Department of Defense is this: How can a government organization become an organization that learns from and interacts with the clients or customers that it is designed to serve, while being controlled and directed by its political environment?

APPENDIX A

**NAVY RDT&E WARFARE CENTERS
ORGANIZATION CHART**

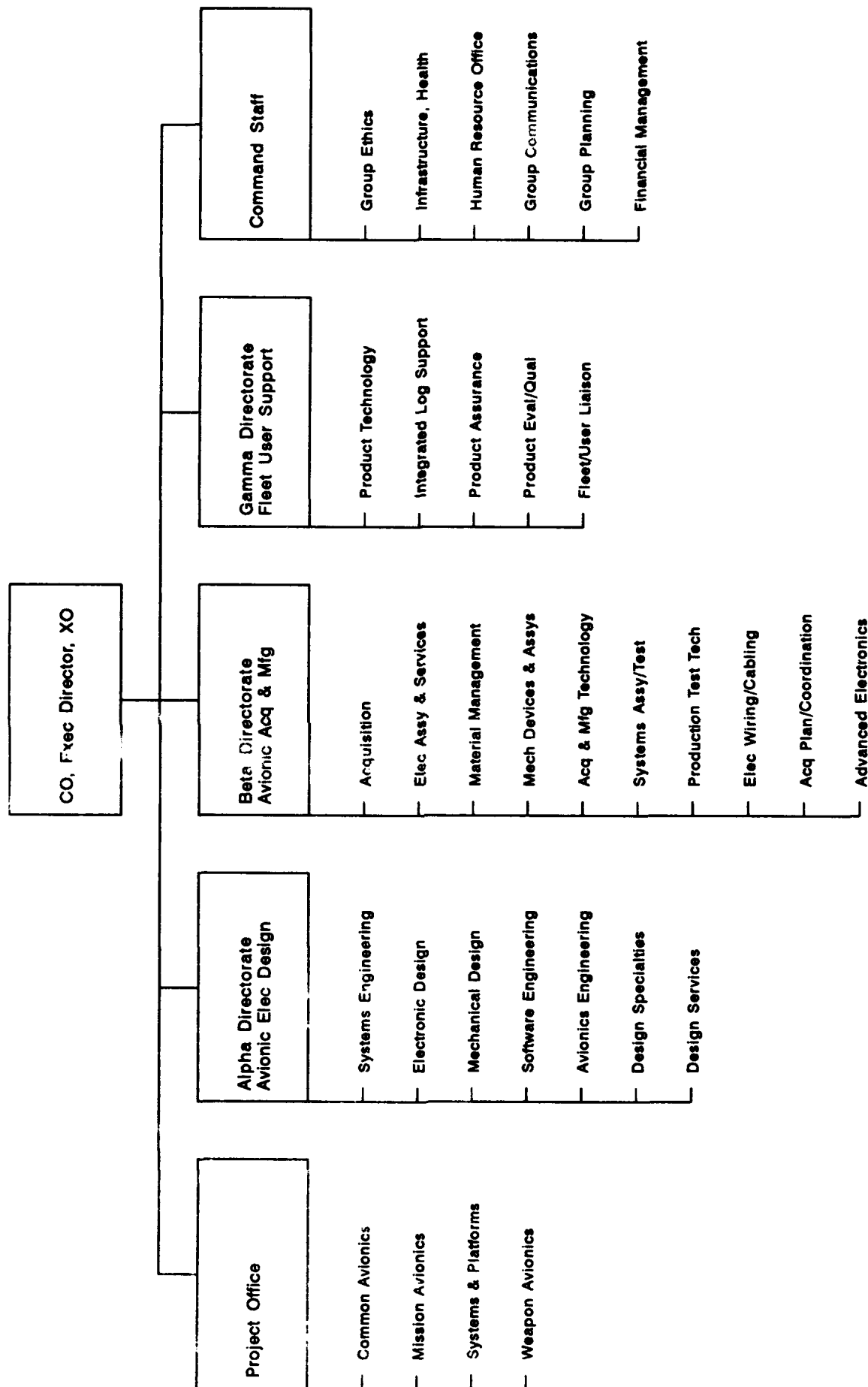


APPENDIX B
NAVAL AVIONICS CENTERS ORGANIZATION CHART



APPENDIX C

Naval Air Warfare Center-Aircraft Division, Indianapolis (NAWC-ADI)



APPENDIX D PRELIMINARY COMMUNICATIONS PROCESS MODEL

INDEPENDENT VARIABLES

Status Changes
 Feelings of Empowerment
 - decision making authority
 - ability to be proactive
 Valuation of Competency Center
 - CC as "cost"
 Role clarity/responsibilities
 Degree of team development
 Visibility of top management
 Power struggle (CCs and PLs)
 Readiness to be self-managing
 Importance of job
 Going around the system

COMM PROCESSES

Performance Feedback
 - enough?
 - from who?
 Career path information
 - options?
 - clarity
 PARS system comms
 Honesty of comms
 "Real" schedules
 Mechanism for sharing;
 - successes
 - innovation
 - new projects
 Process orientation
 - culture
 - task
 Linkage to customers

OUTCOME VARIABLES

Productivity
 Satisfaction
 - job
 - communication
 Org effectiveness
 - problem solving
 - faster?
 - more direct
 - approval levels
 Innovation
 Commitment to center
 Utilization of skills
 - job rqmts
 - adequate preps
 for job I hold

OFFICIAL COMMUNICATION SOURCES

Regular safety meetings/information briefings
 Round Table meetings
 Office automation weekly bulletin
 "Destinations" (corporate video production)
 "Beamrider"
 "NAWC Digest" (video taped production)
 Four-fold pamphlets
 "Team Forum" (NAVAIR)

INFORMAL COMMUNICATION SOURCES

Peers within my own team
 Peers within my Competency Center
 Peers outside my Competency Center
 My former supervisor
 External customer of my work (fleet)
 Internal customer of my work
 Competency Center Director (CCD)
 Directorate Management Team
 Project Leaders (PLs)
 Personnel Development Associates (PDAs)
 Master Schedulers (MS)
 Process Improvement Associates (PIAs)
 Grapevine

GENERAL COMMUNICATIONS

Satisfaction with communications from:
 - above and below me
 Openness to new ideas
 Feel top mgmt looking to the future?
 Satisfaction with information/support from:
 - PDAs, PIAs, MSs, CCDs

HORIZONTAL COMMUNICATIONS

Negotiating Conflict
 - within teams
 - between teams
 Internal team communication
 - coordination/responsibility
 - without supervisors
 Horizontal linkages:
 - MS to PL
 - PDA to PL
 - Level 1 CC to Project Office

APPENDIX E

NAWC-ADI COMMUNICATION SURVEY

This appendix contains a copy of the questionnaire administered to personnel employed at the Naval Air Warfare Center, Aircraft Division, Indianapolis.

Naval Air Warfare Center, Aircraft Division, Indianapolis

COMMUNICATION SURVEY

INSTRUCTIONS

As stated in the cover letter, this survey is part of a study being conducted for NAWC-AD, Indianapolis. In April, a team of researchers from the Naval Postgraduate School interviewed approximately fifty people throughout NAWC-ADI. This questionnaire builds on information gathered from these interviews and will allow for input from a broad representative group. The questionnaire should take about 40-45 minutes to complete. The main purpose of the study is to identify information and communication patterns as they relate to your work. Findings will be used as input for managerial decision-making regarding the amount and quality of work-related information you are receiving.

Please answer each question as honestly and frankly as possible, without dwelling on a particular section or question. There are no "trick" questions, nor are there "right" or "wrong" answers.

The format for most questions asks you to rate a statement using one of the following choices:

- 1=strongly disagree
- 2=disagree
- 3=agree
- 4=strongly agree

For example, if you strongly agree with the statement, you would complete the question as follows;

I'd rather be fishing

[1] [2] [3] [4]

After completing the survey, please remove the cover letter, place the survey in the attached envelope, seal the envelope, and send it to Dale Lewis, Mail Stop 41. The questionnaires will be forwarded in the sealed envelopes to researchers at the Naval Postgraduate School.

PLEASE RETURN TO DALE LEWIS BY 23 JUNE.

YOUR INDIVIDUAL RESPONSES WILL BE KEPT COMPLETELY CONFIDENTIAL.

DEMOGRAPHIC INFORMATION

The following information is needed to help us with the statistical analysis of the data. Individual responses will not be seen by anyone at the Center. We appreciate your time and effort in completing this survey.

1. Competency Center you are assigned to: (for example: Beta 4, Gamma 3, etc.)

1. Alpha _____
2. Beta _____
3. Gamma _____
4. Command Staff _____
5. other (specify) _____

2. My level in the organization is: (circle one)

1. Level 1 (near horizon)
2. Level 2 (mid horizon)
3. Level 3 (far horizon)
4. unknown

3. I am a member of the following teams (circle all that apply)

1. Competency Management Team
2. Customer Support Team
3. Capacity Team
4. Project Team
5. List any other work groups of which you are a member:

4. Please indicate the specific project(s) on which you spend the most time, along with an estimate of the percentage of time you spend on each one.

Project/Percentage of Time Project/Percentage of Time

I don't know which specific projects my work is for. _____

5. I am a

1. People Development Associate
2. Master Scheduler
3. Process Improvement Associate
4. Competency Center Director
5. Technology/Futurist
6. Project Leader
7. None of the above

6. The department I worked in before the reorganization was: _____
(For example 100,200,etc)

7. I have worked at NAWC-ADI

1. less than five years
2. 5-10 years
3. 11-15 years
4. 16-20 years
5. more than 20 years

SECTION I. TASK CHARACTERISTICS

The purpose of this section is to explore characteristics of task-related activities. Please answer the questions below in reference to the team on which you spend the greatest amount of your time.

1. a. The team on which I spend the greatest amount of my time is:

b. Does not apply; I am not on a team. (Please continue with the survey even if you are not a member of a team.)

Instructions: For the questions below, use the following response choices:

1=strongly disagree
2=disagree
3=agree
4=strongly agree

- | | |
|--|-----------------|
| 2. I have to do things in certain ways that I think should be done differently. | [1] [2] [3] [4] |
| 3. I have to buck a rule or policy in order to carry out an assignment. | [1] [2] [3] [4] |
| 4. I receive conflicting requests from two or more people. | [1] [2] [3] [4] |
| 5. I receive assignments without adequate resources and materials to execute it. | [1] [2] [3] [4] |
| 6. I work on unnecessary things. | [1] [2] [3] [4] |
| 7. I am committed to the success of NAWC-ADI. | [1] [2] [3] [4] |
| 8. I have a sense that things are moving along well. | [1] [2] [3] [4] |
| 9. I feel free to select different paths or approaches to my work. | [1] [2] [3] [4] |
| 10. My work serves a valuable purpose. | [1] [2] [3] [4] |
| 11. The work I am doing is important. | [1] [2] [3] [4] |
| 12. I am doing worthwhile things. | [1] [2] [3] [4] |
| 13. I have a sense of freedom in what I'm doing. | [1] [2] [3] [4] |
| 14. I am committed to the success of my project team. | [1] [2] [3] [4] |
| 15. How I go about things is up to me. | [1] [2] [3] [4] |
| 16. I determine what I do on my job. | [1] [2] [3] [4] |
| 17. I am getting results. | [1] [2] [3] [4] |
| 18. I am growing and developing professionally on this job. | [1] [2] [3] [4] |
| 19. My work is going well. | [1] [2] [3] [4] |
| 20. I feel certain about how much authority I have. | [1] [2] [3] [4] |
| 21. Clear, planned goals and objectives exist for my job. | [1] [2] [3] [4] |

1=strongly disagree
2=disagree
3=agree
4=strongly agree

22. I am committed to the success of my competency center. [1] [2] [3] [4]
23. I know exactly what is expected of me. [1] [2] [3] [4]
24. My work is complex and requires information and knowledge from many technical disciplines. [1] [2] [3] [4]
25. The technical goals of my work are challenging and are difficult to meet. [1] [2] [3] [4]
26. The work that I am doing is so complex that pieces of it can only be understood by the people who are directly involved. [1] [2] [3] [4]
27. Indirect cost activities add value to this organization. [1] [2] [3] [4]
28. My team has the authority to make decisions that affect our day-to-day work. [1] [2] [3] [4]
29. When my team comes to consensus about how to solve a problem, we have the freedom to implement it. [1] [2] [3] [4]
30. Problem solving is done by going directly to the relevant team rather than through management. [1] [2] [3] [4]
31. I feel comfortable making decisions that affect my team. [1] [2] [3] [4]
32. I wish that a supervisor instead of the group itself handled problems with group members. [1] [2] [3] [4]
33. Part of my job is to notify relevant people if the work I am doing has quality, cost, or schedule problems. [1] [2] [3] [4]
34. My team has effectively taken over the responsibilities that used to be held by a manager/supervisor. [1] [2] [3] [4]
35. I am generally satisfied with the kind of work I do on this job. [1] [2] [3] [4]
36. My team has the competence to make decisions about our work without approval of a supervisor. [1] [2] [3] [4]
37. I care about what I am doing. [1] [2] [3] [4]
38. I am exercising a lot of choice in what I am doing. [1] [2] [3] [4]
39. I know my job responsibilities. [1] [2] [3] [4]
40. I have an input into decisions that affect my team. [1] [2] [3] [4]
41. Generally speaking, I am very satisfied with this job. [1] [2] [3] [4]

SECTION II. ORGANIZATIONAL CHARACTERISTICS

The purpose of this section is to explore the various characteristics of the organization.

Instructions: For question 1, answer the questions below in reference to the team on which you spend the greatest amount of your time. Please use the following response choices:

1=my project manager dominates...

2=my project manager has a greater influence than my Competency Center Management Team (CCMT) in...

3=both contribute equally...

4=CCMT has a greater influence than my project manager in...

5=CCMT dominates...

1. To what degree does your project manager or competency center management team (CCMT) influence:

a. the technical details of your work [1] [2] [3] [4] [5]

b. your performance evaluations [1] [2] [3] [4] [5]

c. getting selected to work on a project [1] [2] [3] [4] [5]

d. your training opportunities [1] [2] [3] [4] [5]

e. improvements in the way things get done [1] [2] [3] [4] [5]

f. determination of policies and practices [1] [2] [3] [4] [5]

Instructions: For the questions below, use the following response choices:

1=strongly disagree

2=disagree

3=agree

4=strongly agree

2. There are less bureaucratic obstacles to overcome since the re-organization. [1] [2] [3] [4]
3. The work environment supports people in taking advantage of new opportunities they encounter. [1] [2] [3] [4]
4. There is an atmosphere of confidence at NAWC-ADI. [1] [2] [3] [4]
5. Since the reorganization problems are solved more directly. [1] [2] [3] [4]
6. People in this organization are receptive to creative new ways of looking at our tasks. [1] [2] [3] [4]
7. People in this organization are strongly committed to doing high quality work. [1] [2] [3] [4]
8. The organization supports activities that address potential problems before they occur. [1] [2] [3] [4]
9. The organization supports personnel in pursuing new opportunities. [1] [2] [3] [4]

1=strongly disagree
 2=disagree
 3=agree
 4=strongly agree

10. The organization supports personnel in trying new ways of doing things. [1] [2] [3] [4]
11. Teams work together to get the job done. [1] [2] [3] [4]
12. Top management (Level 3) has a good idea of the work that is done in my area. [1] [2] [3] [4]
13. I'd like to see top management out in the work spaces more often. [1] [2] [3] [4]
14. In this organization, we all work together as a team. [1] [2] [3] [4]
15. Taking initiative is rewarded at NAWC-ADI. [1] [2] [3] [4]
16. People in this organization are strongly committed to meeting project deadlines. [1] [2] [3] [4]
17. People who offer new ideas are likely to get clobbered. [1] [2] [3] [4]
18. The working environment here encourages one to share information to help other groups. [1] [2] [3] [4]
19. Cooperation with other work groups is valued and rewarded. [1] [2] [3] [4]
20. The NAWC-ADI environment supports communication and cooperation across organizational units. [1] [2] [3] [4]
21. Indirect cost activities are not viewed as value added within the center. [1] [2] [3] [4]
22. The current organizational structure enhances my ability to serve customers in a quality manner. [1] [2] [3] [4]
23. The Center's Corporate Management Team is making decisions that will make our future more secure. [1] [2] [3] [4]
24. This organization encourages me to share ideas I have about ways to improve processes or resolve problems. [1] [2] [3] [4]
25. The activities of the competency centers are contributing to the Center's performance effectiveness and capabilities. [1] [2] [3] [4]
26. If I report problems with quality, schedule or cost in the job I am doing, I will be held responsible. [1] [2] [3] [4]
27. Personnel in this organization are receptive to suggestions, evaluation, and criticism. [1] [2] [3] [4]
28. Personnel in this organization feel responsible for initiating communication about cost, quality and schedule problems on the job. [1] [2] [3] [4]

SECTION III. TEAMWORK

The purpose of this section is to identify group processes. Please answer the questions in reference to the team on which you spend the greatest amount of your time. Use the following response choices:

- 1=to no extent
- 2=rarely
- 3=sometimes
- 4=frequently
- 5=to a great extent

1. My team discusses the things that get in the way of us reaching our productivity/quality goals. [1] [2] [3] [4] [5]
2. My team discusses how skilled our fellow team members will need to be to do their jobs in the future and the strengths they will bring to their jobs. [1] [2] [3] [4] [5]
3. My team discusses the things that have gotten in the way of us reaching our productivity/quality goals. [1] [2] [3] [4] [5]
4. My team discusses the obstacles that may get in the way of building trust within our team. [1] [2] [3] [4] [5]
5. My team discusses the support we receive from top management and what management has done to help us. [1] [2] [3] [4] [5]
6. My team discusses new skills we need to learn and the best way to learn these skills. [1] [2] [3] [4] [5]
7. My team discusses how much of an opportunity there is for everyone to have a say in our group's decisions and the things that get in the way of open participation. [1] [2] [3] [4] [5]
8. My team discusses the need to coordinate with other groups at NAWC-ADI and the things that get in the way of successful coordination. [1] [2] [3] [4] [5]
9. My team discusses the things that have helped us reach our productivity/quality goals. [1] [2] [3] [4] [5]
10. My team discusses the organization's mission and our role in achieving that mission. [1] [2] [3] [4] [5]
11. My team discusses the things our fellow team members don't do very well. [1] [2] [3] [4] [5]

Instructions: For the questions below, use the following choices:

1=strongly disagree

2=disagree

3=agree

4=strongly agree

- | | | |
|-----|---|-----------------|
| 12. | When two or more people in our group have a disagreement, we tend to talk honestly and directly with one another. | [1] [2] [3] [4] |
| 13. | We need more training in how teams work together. | [1] [2] [3] [4] |
| 14. | There are feelings among team members which tend to pull the group apart. | [1] [2] [3] [4] |
| 15. | The people I work with help each other when someone falls behind or gets in a tight spot. | [1] [2] [3] [4] |
| 16. | My team is able to respond to unusual demands. | [1] [2] [3] [4] |
| 17. | People on my team are inflexible about trying new ways of doing things. | [1] [2] [3] [4] |
| 18. | People on my team are receptive to creative new ways of looking at tasks. | [1] [2] [3] [4] |
| 19. | People on my team are strongly committed to completing high quality technical work. | [1] [2] [3] [4] |
| 20. | My co workers are afraid to express their real views. | [1] [2] [3] [4] |
| 21. | There is constant bickering among my team members. | [1] [2] [3] [4] |
| 22. | People on my team often acknowledge one another for their efforts. | [1] [2] [3] [4] |
| 23. | Everyone is involved when we make decisions. | [1] [2] [3] [4] |
| 24. | When problems arise, everybody involved works together to solve them. | [1] [2] [3] [4] |
| 25. | We are ready to defend each other from criticism by people outside our team. | [1] [2] [3] [4] |
| 26. | My team has a strong commitment to satisfying customers. | [1] [2] [3] [4] |
| 27. | Some of the people I work with have no respect for others. | [1] [2] [3] [4] |

SECTION IV. PROBLEM IDENTIFICATION

This section contains statements which describe a number of different types of problems which you may have encountered. Considering the team on which you spend the greatest percentage of your time, please identify the extent to which any of these problems occur.

For the questions below, use the following response choices:

- 1=to no extent
- 2=rarely
- 3=sometimes
- 4=frequently
- 5=to a great extent

1. Not all of the information and knowledge required for doing the task or making decisions is available when it is needed. [1] [2] [3] [4] [5]
2. The information and knowledge for doing the task and making decisions is available, but it is usually ignored or used incorrectly. [1] [2] [3] [4] [5]
3. Because of conflicts or mistrust between people or groups, important knowledge and information is withheld. [1] [2] [3] [4] [5]
4. Because of the lack of cooperation between various individuals, work performance and decision making is less than optimum. [1] [2] [3] [4] [5]
5. Different individuals or groups fail to understand information because of the use of specialized language. [1] [2] [3] [4] [5]
6. People who have relevant information are missing from key discussions. [1] [2] [3] [4] [5]
7. Some people are involved in discussions or tasks who should not be. [1] [2] [3] [4] [5]
8. Important tasks and discussions are impaired because of lack of preparation and planning. [1] [2] [3] [4] [5]
9. Commitments to time schedules are made with inadequate input from other parties. [1] [2] [3] [4] [5]
10. Procedures for important tasks are unclear, ambiguous, or non-existent. [1] [2] [3] [4] [5]

1=to no extent
2=rarely
3=sometimes
4=frequently
5=to a great extent

- | | | |
|-----|--|---------------------|
| 11. | Important information from other areas is not taken into account before major technical decisions are made. | [1] [2] [3] [4] [5] |
| 12. | The rules and climate in key meetings are too formal; relevant issues or proposals are not considered. | [1] [2] [3] [4] [5] |
| 13. | Too many people have responsibility for the same task; everyone assumes that someone else is following through on important items. | [1] [2] [3] [4] [5] |
| 14. | Relevant past work is inaccessible because of lack of documentation. There is much repetition of past experiments. | [1] [2] [3] [4] [5] |
| 15. | The values and orientation between various individuals or groups is too different; people are working at cross purposes with each other. | [1] [2] [3] [4] [5] |
| 16. | Once our group decides on an action to take, we run into barriers from other groups. | [1] [2] [3] [4] [5] |

SECTION V. COMMUNICATION

The purpose of this section is to identify communication patterns within NAWC-ADI.

Instructions: For the questions below, use the following response choices:

- 1=strongly disagree
- 2=disagree
- 3=agree
- 4=strongly agree

1. The people who know my work best give sufficient input to my performance evaluation. [1] [2] [3] [4]
2. I receive regular and timely feedback about my work performance. [1] [2] [3] [4]
3. My competency center management team is receiving sufficient input on my performance from my project, CST or capacity team. [1] [2] [3] [4]
4. My competency center provides adequate direction in career development. [1] [2] [3] [4]
5. Everyone's opinions receive attention. [1] [2] [3] [4]
6. I have the opportunity to give input to top management about ideas and concerns. [1] [2] [3] [4]
7. Company communication provides motivation and stimulates an enthusiasm for meeting organizational goals. [1] [2] [3] [4]
8. Company's communication makes me feel a vital part of the organization. [1] [2] [3] [4]
9. I receive the timely information needed to do my job. [1] [2] [3] [4]
10. People in this organization are made to feel appreciated when they fulfill their responsibilities. [1] [2] [3] [4]
11. When individuals perform in an unsatisfactory manner, their performance deficiencies are brought to their attention. [1] [2] [3] [4]
12. The organization is truly interested in my ideas and concerns. [1] [2] [3] [4]

Instructions: For this section, consider to what extent one or more members of your team does any of the following using the response choices:

1=to no extent
2=rarely
3=to some extent
4=frequently
5=to a great extent

- | | |
|--|---------------------|
| 13. scout outside the group by collecting needed information for solving problems within your group. | [1] [2] [3] [4] [5] |
| 14. gather information about support or opposition to your team's activities. | [1] [2] [3] [4] [5] |
| 15. gather information about demand for your team's output. | [1] [2] [3] [4] [5] |
| 16. gather information and resources from those external to the group necessary for completing your team's work. | [1] [2] [3] [4] [5] |
| 17. seek information of events that might occur which might have an impact on your team's work. | [1] [2] [3] [4] [5] |
| 18. seek feedback from others regarding your team's performance. | [1] [2] [3] [4] [5] |
| 19. work to open up channels with others outside your group. | [1] [2] [3] [4] [5] |
| 20. inform other groups about your team's progress. | [1] [2] [3] [4] [5] |
| 21. coordinate and negotiate work schedules with those outside your group. | [1] [2] [3] [4] [5] |
| 22. tell others outside your team about the merits of your team. | [1] [2] [3] [4] [5] |
| 23. determine what and how much information or resources should be provided to your group. | [1] [2] [3] [4] [5] |
| 24. help people outside your group translate messages into words that members of your group will understand. | [1] [2] [3] [4] [5] |
| 25. buffer the team from unnecessary or unwanted information. | [1] [2] [3] [4] [5] |
| 26. determine the legitimacy of requests made from those outside your group. | [1] [2] [3] [4] [5] |
| 27. deliver needed information and resources to those outside your group. | [1] [2] [3] [4] [5] |
| 28. prevent the release of information that might hamper your group's work. | [1] [2] [3] [4] [5] |
| 29. facilitate the transfer of information from your group to other groups. | [1] [2] [3] [4] [5] |

SECTION VI - INFORMATION AVAILABILITY

Please indicate the amount of information you believe you are getting from the types of information listed below using the following response choices.

1=none
2=some, but not enough
3=enough
4=a bit too much
5=too much

- | | |
|---|---------------------|
| 1. Recognition of my efforts. | [1] [2] [3] [4] [5] |
| 2. Employee benefits and pay. | [1] [2] [3] [4] [5] |
| 3. Promotion and advancement opportunities in my organization. | [1] [2] [3] [4] [5] |
| 4. Organization goals. | [1] [2] [3] [4] [5] |
| 5. Company profits and financial standing. | [1] [2] [3] [4] [5] |
| 6. Organizational policies. | [1] [2] [3] [4] [5] |
| 7. Problems facing my organization | [1] [2] [3] [4] [5] |
| 8. How organization decisions are made that affect my job. | [1] [2] [3] [4] [5] |
| 9. Important new product, service or program developments in my organization. | [1] [2] [3] [4] [5] |
| 10. Process improvement ideas from other groups. | [1] [2] [3] [4] [5] |
| 11. Specific work schedule requirements to help me set priorities. | [1] [2] [3] [4] [5] |
| 12. Changes in other's work schedules that will affect my work. | [1] [2] [3] [4] [5] |
| 13. Information helping me with technical problems I face in my job. | [1] [2] [3] [4] [5] |
| 14. Information about my job performance. | [1] [2] [3] [4] [5] |

SECTION VII. INFORMATION SOURCES

The purpose of this section is to determine which information sources are used for your work. Again, think about the project on which you spend the greatest percentage of your time.

Using the response choices provided, please rate each of the information sources on the following page in terms of:

- The degree to which you actively search out and utilize them. (UTILIZE)
- How accessible that source is. (ACCESS)
- Reliability of information received. (RELIABLE)

<u>UTILIZE</u>	<u>ACCESS</u>	<u>RELIABLE</u>
1=never	1=difficult	1=always
2=almost never	2=fairly hard	2=mostly
3=sometimes	3=moderate	3=sometimes
4=frequently	4=fairly easy	4=fairly
5=always	5=easy	5=very

For example: If you frequently receive and read, have easy access to, and believe the information provided in the daily newspaper is sometimes reliable, the following responses would be appropriate.

<u>INFORMATION SOURCE</u>	<u>UTILIZE</u>	<u>ACCESS</u>	<u>RELIABLE</u>
#. The Daily Newspaper	<u>4</u>	<u>5</u>	<u>3</u>

UTILIZE

1=never
 2=almost never
 3=sometimes
 4=frequently
 5=always

ACCESS

1=difficult
 2=fairly hard
 3=moderate
 4=fairly easy
 5=easy

RELIABLE

1=always
 2=mostly
 3=sometimes
 4=fairly
 5=very

INFORMATION SOURCEUTILIZEACCESSRELIABLE

1. Peers within my own team
2. Peers from other teams within my Competency Center
3. Peers outside my Competency Center
4. My former supervisor
5. Sponsors
6. End users
7. Competency Center Management Director
8. Directorate Management Team
9. Formal management presentations
10. Project leaders
11. Personal Development Associates
12. Master Schedulers
13. Process Improvement Associates
14. Round Tables
15. Office Automation Weekly Bulletin
16. "Destinations" (corporate video production).
17. Beamrider
18. "NAWC Digest"
19. Four-fold pamphlets
20. Team Forum (NAVAIR)

_____	_____	_____
_____	_____	_____
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_____	_____	_____

SECTION VIII. ADAPTABILITY AND INFLUENCE

Instructions: For the questions below, use the following response choices:

- 1=not confident at all
- 2=a little confident
- 3=fairly confident
- 4=confident
- 5=very confident

1. Please indicate your level of confidence that you as an individual can learn any new skills that may be necessary for you to adapt and compete in the future. [1] [2] [3] [4] [5]
2. Please indicate your level of confidence that your team/group can learn any new skills that may be necessary for your team to adapt and compete in the future. [1] [2] [3] [4] [5]
3. Please indicate your level of confidence that you as an individual can influence the policies and procedures at NAWC-ADI. [1] [2] [3] [4] [5]
4. Please indicate your level of confidence that your team/group can influence the policies and procedures at NAWC-ADI. [1] [2] [3] [4] [5]

Instructions: For the questions below, use the following response choices:

- 1=greatly decreased
- 2=somewhat decreased
- 3=stayed the same
- 4=somewhat increased
- 5=greatly increased

5. Since the reorganization, the status of my job has [1] [2] [3] [4] [5]
6. Since the reorganization, my authority to make decisions about my work has [1] [2] [3] [4] [5]
7. Since the reorganization, the responsibilities of my job have [1] [2] [3] [4] [5]
8. Since the reorganization, my freedom to make decisions about my work has [1] [2] [3] [4] [5]
9. Since the reorganization, my work load has [1] [2] [3] [4] [5]
10. Since the reorganization, the opportunity for innovation and creativity has [1] [2] [3] [4] [5]

1=greatly decreased
2=somewhat decreased
3=stayed the same
4=somewhat increased
5=greatly increased

11. In the past six months, cycle time has [1] [2] [3] [4] [5]
12. In the past six months, my productivity has [1] [2] [3] [4] [5]
13. In the past six months, NAWC-ADI's overall effectiveness has [1] [2] [3] [4] [5]
14. In the past six months, the center's ability to serve customers in a quality manner has [1] [2] [3] [4] [5]
15. In the past six months, morale at NAWC-ADI has [1] [2] [3] [4] [5]
16. In the past six months, the effectiveness of work flow in the organization has [1] [2] [3] [4] [5]
17. In the past six months, the quality of products and work produced at NAWC-ADI has [1] [2] [3] [4] [5]
18. Think of the three individuals in your group who are the most valuable sources of information for your work. How long does it take you to walk from your work station to theirs?

Most valuable source _____ minutes walking time
Second most valuable resource _____ minutes walking time
Third most valuable source _____ minutes walking time

APPENDIX F

NAWC-ADI COMMUNICATION SURVEY COVER SHEET

This appendix contains a copy of a cover sheet generated by NAWC-ADI to distribute the surveys to specific employees (the name has been removed for confidentiality).

To: Name:
 Mail-Stop:

16 Jun 93

From: Commanding Officer, Naval Air Warfare Center, Aircraft Division,
 Indianapolis

Subj: EMPLOYEE SURVEY

1. The attached questionnaire is designed to obtain and evaluate employee opinion regarding the new NAWC organization. I am having it sent to a wide range of employees across the center to obtain input from as many people as possible.
2. Your responses to the questions will remain confidential. Please fill in your questionnaire today and send it to Dale Lewis, M/S 41. The questionnaires will remain sealed; Dale will forward them to the Naval Post Graduate School in Monterey, California for tabulation.
3. By responding candidly to these questions you will contribute to the success of our organization and will help make NAWC a more productive, efficient and pleasant place to work.


J. D. LANGFORD
Acting

APPENDIX G

DEMOGRAPHICS FREQUENCY LISTING

This appendix contains a complete frequency listing for all the demographic variables from the NAWC-ADI communication survey.

D1 Competency Center Assignment

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
Missing Values		14	3.0	3.0	3.0
Alpha Directorate	a	19	4.1	4.1	7.2
	a1	12	2.6	2.6	9.8
	a2	10	2.2	2.2	12.0
	a3	7	1.5	1.5	13.5
	a4	9	2.0	2.0	15.4
	a5	11	2.4	2.4	17.8
	a6	8	1.7	1.7	19.6
	a7	10	2.2	2.2	21.7
Beta Directorate	b	39	8.5	8.5	30.2
	b1	6	1.3	1.3	31.5
	b10	5	1.1	1.1	32.6
	b2	7	1.5	1.5	34.1
	b3	5	1.1	1.1	35.2
	b4	11	2.4	2.4	37.6
	b5	14	3.0	3.0	40.7
	b6	6	1.3	1.3	42.0
	b7	1	.2	.2	42.2
	b8	3	.7	.7	42.8
	b9	4	.9	.9	43.7
Command Staff	cs	94	20.4	20.4	64.1
	cs01	9	2.0	2.0	66.1
	cs02	1	.2	.2	66.3
	cs04	1	.2	.2	66.5
	cs05	4	.9	.9	67.4
	cs06	8	1.7	1.7	69.1
	cs07	1	.2	.2	69.3
	cs08	4	.9	.9	70.2
Gamma Directorate	g	25	5.4	5.4	75.7
	g1	7	1.5	1.5	77.2
	g2	14	3.0	3.0	80.2
	g3	7	1.5	1.5	81.7
	g4	9	2.0	2.0	83.7
	g5	4	.9	.9	84.6
Project Office	po	53	11.5	11.5	96.1
	po101	2	.4	.4	96.5
	po102	7	1.5	1.5	98.0
	po103	2	.4	.4	98.5
	po104	4	.9	.9	99.3
	po105	3	.7	.7	100.0
Total		460	100.0	100.0	

Valid cases 460 Missing cases 0

DIRECTOR# Directorate (Numeric translation)

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
Alpha	1	86	18.7	19.4	19.4
Beta	2	101	22.0	22.7	42.1
Gamma	3	66	14.3	14.9	57.0
Command Staff	4	120	26.1	27.0	84.0
Project Office	5	71	15.4	16.0	100.0
.		16	3.5	Missing	
Total		460	100.0	100.0	
Valid cases	444	Missing cases	16		

D2 Level in the Organisation

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
Level 1	1	177	38.5	40.9	40.9
Level 2	2	138	30.0	31.9	72.7
Level 3	3	33	7.2	7.6	80.4
Unknown	4	85	18.5	19.6	100.0
	.	27	5.9	Missing	
Total		460	100.0	100.0	

Valid cases 433 Missing cases 27

D5 Management team jobs

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
People Development A	1	23	5.0	5.1	5.1
Master Scheduler	2	28	6.1	6.3	11.4
Process Improvement	3	64	13.9	14.3	25.7
Competency Center Di	4	29	6.3	6.5	32.2
Technology/Futurist	5	8	1.7	1.8	34.0
Project Leader	6	65	14.1	14.5	48.5
None of the above	7	230	50.0	51.5	100.0
	.	13	2.8	Missing	
Total		460	100.0	100.0	

Valid cases 447 Missing cases 13

D5A Management team jobs (in addition to jobs in D5)

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
Master Scheduler	2	1	.2	25.0	25.0
Process Improvement	3	1	.2	25.0	50.0
Project Leader	6	2	.4	50.0	100.0
	.	456	99.1	Missing	
Total		460	100.0	100.0	

Valid cases 4 Missing cases 456

D5B Management team jobs (in addition to jobs in D5 and D5A)

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
Process Improvement	3	1	.2	50.0	50.0
Project Leader	6	1	.2	50.0	100.0
	.	458	99.6	Missing	
Total		460	100.0	100.0	

Valid cases 2 Missing cases 458

D6 Department previously worked for

<u>Value Label</u>	<u>Value</u>	<u>Frequency</u>	<u>Percent</u>	<u>Valid Percent</u>	<u>Cum Percent</u>
Commanding Officer's	0	15	3.3	3.4	3.4
Executive Director's	10	2	.4	.5	3.8
Plans and Programs	70	30	6.5	6.8	10.6
Security	100	6	1.3	1.4	11.9
Manufacturing Techno	200	87	18.9	19.6	31.5
Comptroller	300	18	3.9	4.1	35.6
Prduct Integrity Ass	400	49	10.7	11.0	46.6
Civilian Personnel	500	14	3.0	3.2	49.8
Contracting and Mate	600	19	4.1	4.3	54.1
Technical and Operat	700	47	10.2	10.6	64.6
Systems and Technolo	800	70	15.2	15.8	80.4
Systems and Engineer	900	87	18.9	19.6	100.0
.	.	16	3.5	Missing	
Total		460	100.0	100.0	

Valid cases 444 Missing cases 16

D7 Tenure at NAWC-ADI

<u>Value Label</u>	<u>Value</u>	<u>Frequency</u>	<u>Percent</u>	<u>Valid Percent</u>	<u>Cum Percent</u>
less than 5 years	1	55	12.0	12.1	12.1
5-10 years	2	175	38.0	38.5	50.7
11-15 years	3	81	17.6	17.8	68.5
16-20 years	4	29	6.3	6.4	74.9
more than 20 years	5	114	24.8	25.1	100.0
.	.	6	1.3	Missing	
Total		460	100.0	100.0	

Valid cases 454 Missing cases 6

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